भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	Pragativadi.com		
Date	21st August 2024, 2024	Language	English
Headline	IIT Bhubaneswar researchers develop Solar-Powered Microwave Pyrolysis Reactor for Sustainable Waste Management		
Link	https://pragativadi.com/iit-bhubaneswar-researchers-develop-solar-powered-microwave-pyrolysis-reactor-for-sustainable-waste-management/		

Bhubaneswar: A research team from the School of Infrastructure at the Indian Institute of Technology (IIT) Bhubaneswar has developed an innovative solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics. The novel reactor uses microwave-assisted pyrolysis to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the characteristics of the feedstock and operating conditions.

Current solid waste management practices primarily involve incineration, biogas plants, or landfill disposal, offering limited opportunities for recycling. Incineration, while an alternative to landfilling, often leads to significant environmental pollution through the release of toxic gases and ashes. The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar represents a promising solution to these challenges."Microwave-assisted pyrolysis is a technology that produces valuable end products like biochar, bio-oil, and syngas in a very short amount of time, meeting the urgent need for sustainable waste management," said Dr. Remya Neelancherry, the lead researcher of the project. "Our research at IIT Bhubaneswar is focused on the feasibility and applicability of these end products across various sectors, including agriculture, transportation, and energy production."Indian patent is granted on the mentioned

technology.

A Green and Sustainable Approach to Waste Conversion

Dr. Remya explains the technology's working principles: "This emerging technology utilizes microwave radiation to generate homogeneous heat within the feedstock, enabling efficient conversion into valuable end products at a faster rate with precise control over reactions. Furthermore, the reactor operates entirely on solar power, ensuring sustainability and self-reliance without imposing any additional energy demands."This is a novel, mobile technology requiring minimal footprint area, capable of converting waste at a rate of 10 kg/h into high-value end-products. The ease of mobility promotes decentralized waste management. Moreover, the technology is carbon-neutral, offering investors a direct opportunity to generate carbon credits.

The end products of this process, biochar and bio-oil, have a wide range of applications, from healthcare to agriculture and industrial applications. Studies suggest that biochar could be a promising replacement for coal, while bio-oil can serve as an alternative to petroleum products. The conversion of high-heating-value refuse into these energy products can support efforts to achieve net-zero emissions and meet the IPCC's (Intergovernmental Panel on Climate Change) 2°C global warming challenge. Other significant applications of biochar include soil improvement, slow-release fertilizers, carbon capture, and wastewater treatment.

This environment-friendly technology can be implemented by municipalities and industries across various locations within cities, offering the potential to generate significant revenue with minimal pollution compared to incineration and other conventional waste management techniques.

"Depending on the waste management needs, this technology can be implemented in two forms: with a fixed bed reactor or a fluidized bed reactor. Research indicates promising potential for this technology to impact the alternative energy market positively. We welcome investors to explore this technology, ensuring environmental protection while fostering market growth," Dr. Remya concluded.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	Update Odisha.com		
Date	21st August, 2024	Language	English
Headline	Solar-powered microwave pyrolysis reactor by IIT Bhubaneswar: A sustainable solution for waste management		
Link	https://updateodisha.com/2024/08/21/solar-powered-microwave-pyrolysis-reactor-by-iit-bhubaneswar-a-sustainable-solution-for-waste-management-85618/		

A research team from the School of Infrastructure at the Indian Institute of Technology (IIT) Bhubaneswar has made a groundbreaking advancement in sustainable waste management with the development of a solar-powered microwave pyrolysis reactor. This cutting-edge technology is designed to recover valuable resources from various waste materials, including biomass and plastics, through an efficient and eco-friendly process. The reactor uses microwave-assisted pyrolysis to swiftly convert waste into valuable end products like biochar and bio-oil.

Current solid waste management practices predominantly rely on incineration, biogas plants, or landfill disposal, all of which pose significant environmental challenges. Incineration, for instance, often results in the release of toxic gases and ashes, contributing to pollution. In contrast, the microwave-assisted pyrolysis technology developed by IIT Bhubaneswar presents a carbon-neutral waste conversion method that not only minimizes pollution but also offers the potential to generate carbon credits.

Dr. Remya Neelancherry, the lead researcher of the project, emphasized the importance of this innovation, stating, “Microwave-assisted pyrolysis is a technology that produces valuable end products like biochar, bio-oil, and syngas in a very short amount of time, meeting the urgent need for sustainable waste management.”

How the Technology Works

The reactor operates entirely on solar power, making it a self-reliant and environmentally friendly technology. It utilizes microwave radiation to generate homogeneous heat within the feedstock, allowing for the precise control of reactions and the efficient conversion of waste into valuable products. With a conversion capacity of 10 kg/h, this mobile technology requires minimal footprint area, promoting decentralized waste management across various locations.

Valuable End Products: Biochar and Bio-Oil

The biochar produced through this process is a highly porous carbonaceous material with numerous applications in agriculture, carbon capture, and wastewater treatment. It also holds promise as a replacement for coal, contributing to the global push towards net-zero emissions. Meanwhile, bio-oil serves as an alternative to petroleum products, providing a renewable energy source that can support efforts to meet the IPCC’s (Intergovernmental Panel on Climate Change) 2°C global warming challenge.

Wide Applications and Market Potential

This innovative waste-to-energy technology offers a range of applications across sectors such as healthcare, transportation, and industrial processes. Its decentralized nature makes it ideal for implementation by municipalities and industries, potentially generating significant revenue with minimal pollution compared to traditional waste management methods.

“Depending on the waste management needs, this technology can be implemented in two forms: with a fixed bed reactor or a fluidized bed reactor. We welcome investors to explore this technology, ensuring environmental protection while fostering market growth,” Dr. Remya concluded.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	Odisha Bytes.com		
Date	21st August, 2024	Language	English
Headline	IIT Bhubaneswar Researchers Develop Solar-Powered Microwave Pyrolysis Reactor For Sustainable Waste Management		
Link	https://odishabytes.com/iit-bhubaneswar-researchers-develop-solar-powered-microwave-pyrolysis-reactor-for-sustainable-waste-management/		


Bhubaneswar: A research team from the School of Infrastructure at the Indian Institute of Technology (IIT) Bhubaneswar has developed an innovative solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics.

The novel reactor uses microwave-assisted pyrolysis to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the characteristics of the feedstock and operating conditions.

Current solid waste management practices primarily involve incineration, biogas plants, or landfill disposal, offering limited opportunities for recycling. Incineration, while an alternative to landfilling, often leads to significant environmental pollution through the release of toxic gases and ashes.

The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar represents a promising solution to these challenges.

“Microwave-assisted pyrolysis is a technology that produces valuable end products like biochar, bio-oil, and syngas in a very short amount of time, meeting the urgent need for sustainable waste management,” said Dr. Remya Neelancherry, the lead researcher of the project.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	Deccan Chronicle		
Date	21st August, 2024	Language	English
Headline	IIT Bhubaneswar Develop Solar-Powered Microwave Pyrolysis Reactor		
Link	https://www.deccanchronicle.com/nation/iit-bhubaneswar-develop-solar-powered-microwave-pyrolysis-reactor-for-sustainable-waste-management-1817990		

Bhubaneswar: A research team from the School of Infrastructure at the Indian Institute of Technology (IIT) Bhubaneswar has developed an innovative solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics. The novel reactor uses microwave-assisted pyrolysis to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the characteristics of the feedstock and operating conditions.

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"Microwave-assisted pyrolysis is a technology that produces valuable end products like biochar, bio-oil, and syngas in a very short amount of time, meeting the urgent need for sustainable waste management," said Dr Remya Neelancherry, the lead researcher of the project. “Our research at IIT Bhubaneswar is focused on the

feasibility and applicability of these end products across various sectors, including agriculture, transportation, and energy production. Indian patent is granted on the mentioned technology," he added.

Explaining the technology's working principles, Dr Remya said, "This emerging technology utilizes microwave radiation to generate homogeneous heat within the feedstock, enabling efficient conversion into valuable end products at a faster rate with precise control over reactions. Furthermore, the reactor operates entirely on solar power, ensuring sustainability and self-reliance without imposing any additional energy demands."

"This is a novel, mobile technology requiring minimal footprint area, capable of converting waste at a rate of 10 kg/h into high-value end-products. The ease of mobility promotes decentralized waste management. Moreover, the technology is carbon-neutral, offering investors a direct opportunity to generate carbon credits," he observed. The end products of this process, biochar and bio-oil, have a wide range of applications, from healthcare to agriculture and industrial applications. Studies suggest that biochar could be a promising replacement for coal, while bio-oil can serve as an alternative to petroleum products. The conversion of high-heating-value refuse into these energy products can support efforts to achieve net-zero emissions and meet the IPCC's (Intergovernmental Panel on Climate Change) 2°C global warming challenge. Other significant applications of biochar include soil improvement, slow-release fertilizers, carbon capture, and wastewater treatment. This environment-friendly technology can be implemented by municipalities and industries across various locations within cities, offering the potential to generate significant revenue with minimal pollution compared to incineration and other conventional waste management techniques. "Depending on the waste management needs, this technology can be implemented in two forms: with a fixed bed reactor or a fluidized bed reactor. Research indicates promising potential for this technology to impact the alternative energy market positively. We welcome investors to explore this technology, ensuring environmental protection while fostering market growth," Dr Remya said.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	Udayavani.com		
Date	21st August, 2024	Language	English
Headline	IIT Bhubaneswar Develop Solar-Powered Microwave Pyrolysis Reactor		
Link	https://www.udayavani.com/english-news/iit-bhubaneswar-develops-solar-powered-microwave-reactor-for-efficient-waste-management		

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Representative image

Bhubaneswar: A research team from the Indian Institute of Technology (IIT) Bhubaneswar has developed a solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics.

The reactor uses microwave-assisted pyrolysis to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the feedstock and operating conditions, the institute stated on Wednesday. Pyrolysis is the heating of an organic material, such as biomass, in the absence of oxygen.

Current solid waste management practices mainly involve incineration, biogas plants, or landfill disposal, which offer limited recycling opportunities. While incineration serves as an alternative to landfilling, it often leads to significant environmental pollution through the release of toxic gases and ash, it said.

The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar's School of Infrastructure offers a promising solution to these challenges, the statement added.

"Microwave-assisted pyrolysis produces valuable end products like biochar, bio-oil, and syngas in a very short time, addressing the urgent need for sustainable waste management," said Remya Neelancherry, the lead researcher.

"Our research at IIT Bhubaneswar focuses on the feasibility and applicability of these products across various sectors, including agriculture, transportation, and energy production," Neelancherry added.

This environmentally friendly technology can be implemented by municipalities and industries in various locations within cities, offering the potential for significant revenue generation with minimal pollution compared to incineration and other conventional waste management techniques, he said.

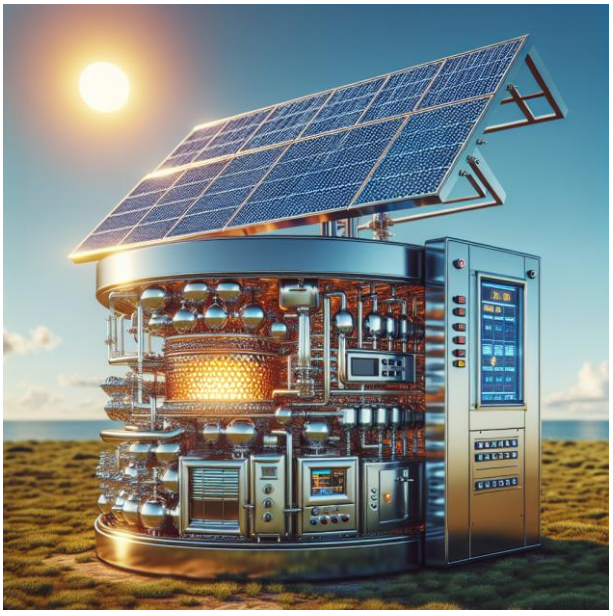
Depending on waste management needs, the technology can be implemented with either a fixed bed reactor or a fluidized bed reactor, he added.

"Research indicates promising potential for this technology to positively impact the alternative energy market. We encourage investors to explore this technology, ensuring environmental protection while fostering market growth," Neelancherry said.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	DevDiscourse.com		
Date	21st August, 2024	Language	English
Headline	IIT Bhubaneswar Engineers Revolutionary Solar-Powered Pyrolysis Reactor		
Link	https://www.devdiscourse.com/article/science-environment/3059276-iit-bhubaneswar-engineers-revolutionary-solar-powered-pyrolysis-reactor		

A research team from IIT Bhubaneswar has created a solar-powered microwave pyrolysis reactor that converts waste materials like biomass and plastics into valuable products such as biochar and bio-oil. This technology aims to improve waste management by offering an eco-friendly alternative to incineration and landfilling, promoting sustainability and potential revenue generation.



A research team from the Indian Institute of Technology (IIT) Bhubaneswar has developed a solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics.

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Current solid waste management practices mainly involve incineration, biogas plants, or landfill disposal, which offer limited recycling opportunities. While incineration serves as an alternative to landfilling, it often leads to significant environmental pollution through the release of toxic gases and ash, it said.

The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar's School of Infrastructure offers a promising solution to these challenges, the statement added. ''Microwave-assisted pyrolysis produces valuable end products like biochar, bio-oil, and syngas in a very short time, addressing the urgent need for sustainable waste management,'' said Remya Neelancherry, the lead researcher.

''Our research at IIT Bhubaneswar focuses on the feasibility and applicability of these products across various sectors, including agriculture, transportation, and energy production,'' Neelancherry added.

This environmentally friendly technology can be implemented by municipalities and industries in various locations within cities, offering the potential for significant revenue generation with minimal pollution compared to incineration and other conventional waste management techniques, he said.

Depending on waste management needs, the technology can be implemented with either a fixed bed reactor or a fluidized bed reactor, he added.

''Research indicates promising potential for this technology to positively impact the alternative energy market. We encourage investors to explore this technology, ensuring environmental protection while fostering market growth,'' Neelancherry said.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	India Education Diary.com		
Date	21st August, 2024	Language	English
Headline	IIT Bhubaneswar researchers develop Solar-Powered Microwave Pyrolysis Reactor for Sustainable Waste Management		
Link	https://indiaeducationdiary.in/iit-bhubaneswar-researchers-develop-solar-powered-microwave-pyrolysis-reactor-for-sustainable-waste-management/		

Bhubaneswar, 21 August 2024: A research team from the School of Infrastructure at the Indian Institute of Technology (IIT) Bhubaneswar has developed an innovative solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics. The novel reactor uses microwave-assisted pyrolysis to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the characteristics of the feedstock and operating conditions.

Current solid waste management practices primarily involve incineration, biogas plants, or landfill disposal, offering limited opportunities for recycling. Incineration, while an alternative to landfilling, often leads to significant environmental pollution through the release of toxic gases and ashes. The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar represents a promising solution to these challenges. “Microwave-assisted pyrolysis is a technology that produces valuable end products like biochar, bio-oil, and syngas in a very short amount of time, meeting the urgent need for sustainable waste management,” said Dr. Remya Neelancherry, the lead researcher of the project. “Our research at IIT Bhubaneswar is focused on the feasibility and applicability of these end products across various sectors, including agriculture, transportation, and energy production.” Indian patent is granted on the mentioned technology.

Dr. Remya explains the technology’s working principles: “This emerging technology utilizes microwave radiation to generate homogeneous heat within the feedstock, enabling efficient conversion into valuable end products at a faster rate with precise control over reactions. Furthermore, the reactor operates entirely on solar power, ensuring sustainability and self-reliance without imposing any additional energy demands.” This is a novel, mobile technology requiring minimal footprint area, capable of converting waste at a rate of 10 kg/h into high-value end-products. The ease of mobility promotes decentralized waste management. Moreover, the technology is carbon-neutral, offering investors a direct opportunity to generate carbon credits.

The end products of this process, biochar and bio-oil, have a wide range of applications, from healthcare to agriculture and industrial applications. Studies suggest that biochar could be a promising replacement for coal, while bio-oil can serve as an alternative to petroleum products. The conversion of high-heating-value refuse into these energy products can support efforts to achieve net-zero emissions and meet the

IPCC's (Intergovernmental Panel on Climate Change) 2°C global warming challenge. Other significant applications of biochar include soil improvement, slow-release fertilizers, carbon capture, and wastewater treatment.

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"Depending on the waste management needs, this technology can be implemented in two forms: with a fixed bed reactor or a fluidized bed reactor. Research indicates promising potential for this technology to impact the alternative energy market positively. We welcome investors to explore this technology, ensuring environmental protection while fostering market growth," Dr. Remya concluded.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	Orissa Post		
Date	21st August, 2024	Language	English
Headline	IIT Bhubaneswar develops solar-powered microwave reactor for efficient waste management		
Link	https://www.orissapost.com/iit-bhubaneswar-develops-solar-powered-microwave-reactor-for-efficient-waste-management/		

Bhubaneswar: A research team from the Indian Institute of Technology (IIT) Bhubaneswar has developed a solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics.

The reactor uses microwave-assisted pyrolysis to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the feedstock and operating conditions, the institute stated on Wednesday. Pyrolysis is the heating of an organic material, such as biomass, in the absence of oxygen.

Current solid waste management practices mainly involve incineration, biogas plants, or landfill disposal, which offer limited recycling opportunities. While incineration serves as an alternative to landfilling, it often leads to significant environmental pollution through the release of toxic gases and ash, it said.

The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar's School of Infrastructure offers a promising solution to these challenges, the statement added.

"Microwave-assisted pyrolysis produces valuable end products like biochar, bio-oil, and syngas in a very short time, addressing the urgent need for sustainable waste management," said Remya Neelancherry, the lead researcher.

"Our research at IIT Bhubaneswar focuses on the feasibility and applicability of these products across various sectors, including agriculture, transportation, and energy production," Neelancherry added.

This environmentally friendly technology can be implemented by municipalities and industries in various locations within cities, offering the potential for significant revenue generation with minimal pollution compared to incineration and other conventional waste management techniques, he said.

Depending on waste management needs, the technology can be implemented with either a fixed bed reactor or a fluidized bed reactor, he added.

"Research indicates promising potential for this technology to positively impact the alternative energy market. We encourage investors to explore this technology, ensuring environmental protection while fostering market growth," Neelancherry said.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	One India.com		
Date	21st August, 2024	Language	Hindi
Headline	IIT भुवनेश्वर ने सौर ऊर्जा से चलने वाला माइक्रोवेव पायरोलिसिस रिएक्टर बना डाला, जानिए इसके फायदे		
Link	https://hindi.oneindia.com/news/india/iit-bhubaneswar-develops-solar-powered-microwave-pyrolysis-reactor-011-1083889.html		

भारतीय प्रौद्योगिकी संस्थान (IIT) भुवनेश्वर की शोध टीम ने सौर ऊर्जा से चलने वाला माइक्रोवेव पायरोलिसिस रिएक्टर विकसित किया है, जिसे बायोमास और प्लास्टिक सहित अलग-अलग और मिश्रित अपशिष्ट पदार्थों से मूल्यवान संसाधनों को पुनर्प्राप्त करने के लिए डिज़ाइन किया गया है।

संस्थान ने बुधवार को बताया कि रिएक्टर माइक्रोवेव-सहायता प्राप्त पायरोलिसिस का उपयोग करके अपशिष्ट को अत्यधिक छिद्रपूर्ण कार्बनयुक्त पदार्थ (बायोचार) और बायो-ऑयल जैसे मूल्यवान उत्पादों में तेजी से परिवर्तित करता है, जो फीडस्टॉक और संचालन स्थितियों पर निर्भर करता है।

पायरोलिसिस ऑक्सीजन की अनुपस्थिति में बायोमास जैसे कार्बनिक पदार्थ को गर्म करना है। वर्तमान ठोस अपशिष्ट प्रबंधन प्रथाओं में मुख्य रूप से भस्मीकरण, बायोगैस संयंत्र या लैंडफिल निपटान शामिल हैं, जो सीमित रीसाइक्लिंग अवसर प्रदान करते हैं। जबकि भस्मीकरण लैंडफिलिंग के विकल्प के रूप में कार्य करता है, यह अक्सर जहरीली गैसों और राख के निकलने के माध्यम से महत्वपूर्ण पर्यावरण प्रदूषण की ओर जाता है। बयान में यह भी कहा गया है कि आईआईटी भुवनेश्वर के स्कूल ऑफ इंफ्रास्ट्रक्चर द्वारा विकसित माइक्रोवेव-सहायता प्राप्त पायरोलिसिस तकनीक इन चुनौतियों का एक आशाजनक समाधान प्रदान करती है।

प्रमुख शोधकर्ता रेम्या नीलांचेरी ने कहा कि माइक्रोवेव-सहायता प्राप्त पायरोलिसिस बहुत कम समय में बायोचार, बायो-ऑयल और सिनगैस जैसे मूल्यवान अंतिम उत्पाद बनाता है, जो टिकाऊ अपशिष्ट प्रबंधन की तत्काल आवश्यकता को पूरा करता है।

नीलांचेरी ने कहा कि आईआईटी भुवनेश्वर में हमारा शोध कृषि, परिवहन और ऊर्जा उत्पादन सहित विभिन्न क्षेत्रों में इन उत्पादों की व्यवहार्यता और प्रयोज्यता पर केंद्रित है। उन्होंने कहा कि यह पर्यावरण के अनुकूल तकनीक शहरों के भीतर विभिन्न स्थानों पर नगर पालिकाओं और उद्योगों द्वारा लागू की जा सकती है, जो भस्मीकरण और अन्य पारंपरिक अपशिष्ट प्रबंधन तकनीकों की तुलना में न्यूनतम प्रदूषण के साथ महत्वपूर्ण राजस्व सृजन की क्षमता प्रदान करती है। नीलांचेरी ने यह भी कहा कि शोध से पता चलता है कि इस तकनीक के वैकल्पिक ऊर्जा बाजार पर सकारात्मक प्रभाव डालने की संभावना है। हम निवेशकों को इस तकनीक का पता लगाने के लिए प्रोत्साहित करते हैं, जिससे बाजार की वृद्धि को बढ़ावा देते हुए पर्यावरण संरक्षण सुनिश्चित हो सके।

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	**The Asian Age**		
Date	**21st August, 2024**	**Language**	**English**
Headline	**IIT Bhubaneswar Develop Solar-Powered Microwave Pyrolysis Reactor**		
Link	**https://www.asianage.com/nation/iit-bhubaneswar-develop-solar-powered-microwave-pyrolysis-reactor-1817991**		

Bhubaneswar: A research team from the School of Infrastructure at the Indian Institute of Technology (IIT) Bhubaneswar has developed an innovative solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics. The novel reactor uses microwave-assisted pyrolysis to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the characteristics of the feedstock and operating conditions.

Current solid waste management practices primarily involve incineration, biogas plants, or landfill disposal, offering limited opportunities for recycling. Incineration, while an alternative to landfilling, often leads to significant environmental pollution through the release of toxic gases and ashes. The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar represents a promising solution to these challenges.

"Microwave-assisted pyrolysis is a technology that produces valuable end products like biochar, bio-oil, and syngas in a very short amount of time, meeting the urgent need for sustainable waste management,"

said Dr Remya Neelancherry, the lead researcher of the project. “Our research at IIT Bhubaneswar is focused on the feasibility and applicability of these end products across various sectors, including agriculture, transportation, and energy production.Indian patent is granted on the mentioned technology,” he added.

Explaining the technology's working principles, Dr Remya said, “This emerging technology utilizes microwave radiation to generate homogeneous heat within the feedstock, enabling efficient conversion into valuable end products at a faster rate with precise control over reactions. Furthermore, the reactor operates entirely on solar power, ensuring sustainability and self-reliance without imposing any additional energy demands.”

“This is a novel, mobile technology requiring minimal footprint area, capable of converting waste at a rate of 10 kg/h into high-value end-products. The ease of mobility promotes decentralized waste management. Moreover, the technology is carbon-neutral, offering investors a direct opportunity to generate carbon credits,” he observed. The end products of this process, biochar and bio-oil, have a wide range of applications, from healthcare to agriculture and industrial applications. Studies suggest that biochar could be a promising replacement for coal, while bio-oil can serve as an alternative to petroleum products. The conversion of high-heating-value refuse into these energy products can support efforts to achieve net-zero emissions and meet the IPCC's (Intergovernmental Panel on Climate Change) 2°C global warming challenge. Other significant applications of biochar include soil improvement, slow-release fertilizers, carbon capture, and wastewater treatment. This environment-friendly technology can be implemented by municipalities and industries across various locations within cities, offering the potential to generate significant revenue with minimal pollution compared to incineration and other conventional waste management techniques. "Depending on the waste management needs, this technology can be implemented in two forms: with a fixed bed reactor or a fluidized bed reactor. Research indicates promising potential for this technology to impact the alternative energy market positively. We welcome investors to explore this technology, ensuring environmental protection while fostering market growth," Dr Remya said.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	The New Indian Express		
Date	22nd August, 2024	Language	English
Headline	IIT Bhubaneswar researchers develop reactor to turn waste into wealth		
Link	https://www.newindianexpress.com/states/odisha/2024/Aug/22/iit-bhubaneswar-researchers-develop-reactor-to-turn-waste-into-wealth		

BHUBANESWAR: In a major boost to sustainable waste management, a group of researchers from IIT Bhubaneswar has developed an innovative solar-powered microwave pyrolysis reactor capable of extracting valuable resources from both segregated and mixed waste materials, including biomass and plastics.

The novel reactor uses microwave-assisted pyrolysis technique to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil from the waste. The researchers' team from the School of Infrastructure at IIT Bhubaneswar has even secured an Indian patent for the technology.

The researchers said the current solid waste management practices primarily involve incineration, biogas plants or landfill disposal offering limited opportunities for recycling. Incineration, an alternative to land-filling, often leads to significant environmental pollution through release of toxic gases and ashes. However, the microwave-assisted pyrolysis technology represents a promising solution to these challenges, they said.

“Microwave-assisted pyrolysis is a technology that produces valuable end products like biochar, bio-oil, and syngas in a very short amount of time, meeting the urgent need for sustainable waste management,” said Remya Neelancherry, the lead researcher of the project.

Neelancherry explained the new and emerging technology utilises microwave radiation to generate homogeneous heat within the feedstock, enabling efficient conversion into valuable end products at a faster rate with precise control over reactions. Besides, the reactor operates entirely on solar power, ensuring sustainability and self-reliance without imposing any additional energy demands.

“This is a novel, mobile technology requiring minimal footprint area, capable of converting waste at a rate of 10 Kg per hour (kg/h) into high-value end-products. The ease of mobility promotes decentralised waste management. Moreover, the technology is carbon-neutral, offering investors a direct opportunity to generate carbon credits,” Neelancherry said.

The end products of this process, biochar and bio-oil, have a wide range of applications, from healthcare to agriculture and industrial applications. Studies also suggest that biochar could be a promising replacement for coal, while bio-oil can serve as an alternative to petroleum products. Other significant applications of biochar include soil improvement, slow-release fertilizers, carbon capture, and waste water treatment.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	The Times of India		
Date	22nd August, 2024	Language	English
Headline	IIT BBS Team develops green reactor for waste management		
Link	https://timesofindia.indiatimes.com/city/bhubaneswar/iit-bbs-team-develops-green-reactor-for-waste-management/articleshow/112694924.cms		

IIT BBS team develops green reactor for waste mgmt

Hemanta Pradhan / Aug 22, 2024, 05:07 IST

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Bhubaneswar: A team of researchers from IIT Bhubaneswar has developed a solar-powered microwave pyrolysis reactor to extract valuable resources from different types of waste, including both segregated and mixed materials such as biomass and plastic. The team has been granted an Indian patent for this technology, which uses microwave radiation to generate uniform heat within the feedstock.

Researchers from IIT Bhubaneswar's School of Infrastructure said the reactor can rapidly convert waste into highly porous carbonaceous material (biochar) and bio-oil, depending on the feedstock characteristics and operating conditions.

Studies suggest that biochar could be a promising replacement for coal, while bio-oil can be an alternative to petroleum products.

Remya Neelancherry, the project's lead researcher, said that current solid waste management methods, like incineration, biogas plants, or landfill disposal, offer limited recycling opportunities. "Incineration, while an alternative to landfilling, often leads to significant environmental pollution due to the release of toxic gases and ashes. Our research offers a promising solution to these challenges," she added.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	News Drum.in		
Date	21st August, 2024	Language	English
Headline	IIT Bhubaneswar develops solar-powered microwave reactor for efficient waste management		
Link	https://www.newsdrum.in/national/iit-bhubaneswar-develops-solar-powered-microwave-reactor-for-efficient-waste-management-6905303		

Bhubaneswar, Aug 21 (PTI) A research team from the Indian Institute of Technology (IIT) Bhubaneswar has developed a solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics.

The reactor uses microwave-assisted pyrolysis to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the feedstock and operating conditions, the institute stated on Wednesday. Pyrolysis is the heating of an organic material, such as biomass, in the absence of oxygen.

Current solid waste management practices mainly involve incineration, biogas plants, or landfill disposal, which offer limited recycling opportunities. While incineration serves as an alternative to landfilling, it often leads to significant environmental pollution through the release of toxic gases and ash, it said.

The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar's School of Infrastructure offers a promising solution to these challenges, the statement added.

"Microwave-assisted pyrolysis produces valuable end products like biochar, bio-oil, and syngas in a very short time, addressing the urgent need for sustainable waste management," said Remya Neelancherry, the lead researcher.

"Our research at IIT Bhubaneswar focuses on the feasibility and applicability of these products across various sectors, including agriculture, transportation, and energy production," Neelancherry added.

This environmentally friendly technology can be implemented by municipalities and industries in various locations within cities, offering the potential for significant revenue generation with minimal pollution compared to incineration and other conventional waste management techniques, he said.

Depending on waste management needs, the technology can be implemented with either a fixed bed reactor or a fluidized bed reactor, he added.

"Research indicates promising potential for this technology to positively impact the alternative energy market. We encourage investors to explore this technology, ensuring environmental protection while fostering market growth," Neelancherry said.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	ET Energy World		
Date	22nd August, 2024	Language	English
Headline	**IIT Bhubaneswar develops solar-powered microwave reactor for efficient waste management**		

Current solid waste management practices mainly involve incineration, biogas plants, or landfill disposal, which offer limited recycling opportunities. While incineration serves as an alternative to landfilling, it often leads to significant environmental pollution through the release of toxic gases and ash, it said.

PTI
Updated On Aug 22, 2024 at 08:23 AM IST

Read by:
631 Industry Professionals

Bhubaneswar: A research team from the Indian Institute of Technology (IIT) Bhubaneswar has developed a solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics. The reactor uses microwave-assisted pyrolysis to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the feedstock and operating conditions, the institute stated on Wednesday. Pyrolysis is the heating of an organic material, such as biomass, in the absence of oxygen.

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The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar's School of Infrastructure offers a promising solution to these challenges, the statement added.

"Microwave-assisted pyrolysis produces valuable end products like biochar, bio-oil, and syngas in a very short time, addressing the urgent need for sustainable waste management," said Remya Neelancherry, the lead researcher.

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Depending on waste management needs, the technology can be implemented with either a fixed bed reactor or a fluidized bed reactor, he added.

"Research indicates promising potential for this technology to positively impact the alternative energy market. We encourage investors to explore this technology, ensuring environmental protection while fostering market growth," Neelancherry said.

Published On Aug 22, 2024 at 08:21 AM IST

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	The Political & Business Daily		
Date	22nd August, 2024	Language	English
Headline	**IIT Bhubaneswar develops solar-powered microwave pyrolysis reactor for efficient waste management**		

IIT Bhubaneswar develops solar-powered microwave pyrolysis reactor for efficient waste management

PBD BUREAU/PTI

BHUBANESWAR, AUG 21

A research team from the Indian Institute of Technology (IIT) Bhubaneswar has developed a solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics.

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The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar's School of Infrastructure offers a promising solution to these challenges, the statement added.

"Microwave-assisted pyrolysis produces valuable end products like biochar, bio-oil, and syngas in a very short time, addressing the urgent need for sustainable waste management," said Remya Neelancherry, the lead researcher.

"Our research at IIT Bhubaneswar focuses on the feasibility and applicability of these products across various sectors, including agriculture, transportation, and energy production," Neelancherry added.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	The Orissa Post		
Date	22nd August, 2024	Language	English
Headline	City IIT develops solar-powered reactor for waste mgmt		

City IIT develops solar-powered reactor for waste mgmt

PNN & AGENCIES

Bhubaneswar, August 21: A research team from the Indian Institute of Technology (IIT) Bhubaneswar has developed a solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics.

The reactor uses microwave-assisted pyrolysis to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the feedstock and operating conditions, the institute stated Wednesday.

Pyrolysis is the heating of an organic material such as biomass in the absence of oxygen.

Current solid waste management practices mainly involve incineration, biogas plants, or landfill disposal which offer limited recycling opportunities. While incineration serves as an alternative to land filling, it often leads to significant environmental pollution through the release of toxic gases and ash, it said.

The microwave-assisted pyrolysis technology developed by IIT-Bhubaneswar's School of Infrastructure offers a promising solution to these challenges, the statement added.

Current solid waste management practices mainly involve incineration, biogas plants, or landfill disposal which offer limited recycling opportunities

While incineration serves as an alternative to land filling, it often leads to significant environmental pollution through the release of toxic gases and ash

"Microwave-assisted pyrolysis produces valuable end products like biochar, bio-oil, and syngas in a very short time, addressing the urgent need for sustainable waste management," said Remya Neelancherry, the lead researcher.

"Our research at IIT-Bhubaneswar focuses on the feasibility and applicability of these products across various sectors, including agriculture, transportation, and energy production," Neelancherry added.

This environment-friendly technology can be implemented by municipalities and industries in various locations within cities, offering the potential for significant revenue generation with minimal pollution compared to incineration and other conventional waste management techniques, Neelancherry said.

Depending on waste management needs, the technology can be implemented with either a fixed bed reactor or a fluidised bed reactor, Neelancherry added.

"Research indicates promising potential for this technology to positively impact the alternative energy market. We encourage investors to explore this technology, ensuring environmental protection while fostering market growth," Neelancherry said.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	Indus Valley Times.com		
Date	22nd August, 2024	Language	English
Headline	**IIT Bhubaneswar researchers develop Solar-Powered Microwave Pyrolysis Reactor for Sustainable Waste Management**		
Link	http://indusvalleytimes.com/news/iit-bhubaneswar-researchers-develop-solar-powered-microwave-pyrolysis-reactor-for-sustainable-waste-management/		

Bhubaneswar, Aug. 22 : A research team from the School of Infrastructure at the Indian Institute of Technology (IIT) Bhubaneswar has developed an innovative solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics. The novel reactor uses microwave-assisted pyrolysis to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the characteristics of the feedstock and operating conditions.

Current solid waste management practices primarily involve incineration, biogas plants, or landfill disposal, offering limited opportunities for recycling. Incineration, while an alternative to landfilling, often leads to significant environmental pollution through the release of toxic gases and ashes. The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar represents a promising solution to these challenges. “Microwave-assisted pyrolysis is a technology that produces valuable end products like biochar, bio-oil, and syngas in a very short amount of time, meeting the urgent need for sustainable waste management,” said Dr. Remya Neelancherry, the lead researcher of the project. “Our research at IIT Bhubaneswar is focused on the feasibility and applicability of these end products across various sectors, including agriculture, transportation, and energy production.” Indian patent is granted on the mentioned technology.

A Green and Sustainable Approach to Waste Conversion

Dr. Remya explains the technology’s working principles: “This emerging technology utilizes microwave radiation to generate homogeneous heat within the feedstock, enabling efficient conversion into valuable end products at a faster rate with precise control over reactions. Furthermore, the reactor operates entirely on solar power, ensuring sustainability and self-reliance without imposing any additional energy demands.” This is a novel, mobile technology requiring minimal footprint area, capable of converting waste at a rate of 10 kg/h into high-value end-products. The ease of mobility promotes decentralized waste management. Moreover, the technology is carbon-neutral, offering investors a direct opportunity to generate carbon credits.

The end products of this process, biochar and bio-oil, have a wide range of applications, from healthcare to agriculture and industrial applications. Studies suggest that biochar could be a promising replacement

for coal, while bio-oil can serve as an alternative to petroleum products. The conversion of high-heating-value refuse into these energy products can support efforts to achieve net-zero emissions and meet the IPCC's (Intergovernmental Panel on Climate Change) 2°C global warming challenge. Other significant applications of biochar include soil improvement, slow-release fertilizers, carbon capture, and wastewater treatment.

This environment-friendly technology can be implemented by municipalities and industries across various locations within cities, offering the potential to generate significant revenue with minimal pollution compared to incineration and other conventional waste management techniques.

"Depending on the waste management needs, this technology can be implemented in two forms: with a fixed bed reactor or a fluidized bed reactor. Research indicates promising potential for this technology to impact the alternative energy market positively. We welcome investors to explore this technology, ensuring environmental protection while fostering market growth," Dr. Remya concluded.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	The Pratidin		
Date	22nd August, 2024	Language	Odia
Headline	**IIT Bhubaneswar researchers develop Solar-Powered Microwave Pyrolysis Reactor for Sustainable Waste Management**		

ଆଇଆଇଟି ଭୁବନେଶ୍ୱର ପକ୍ଷରୁ ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ପାଇଁ
ମାଇକ୍ରୋୱେଭ ପାଇରୋଲିସିସ୍ ରିଆକ୍ଟର୍ ବିକଶିତ

ଭୁବନେଶ୍ୱର, ୨୧।୮ (ନି.ପ୍ର.): ଭାରତୀୟ ପ୍ରଯୁକ୍ତିବିଦ୍ୟା ପ୍ରତିଷ୍ଠାନ (ଆଇଆଇଟି) ଭୁବନେଶ୍ୱରର ସ୍କୁଲ ଅଫ୍ ଇନଫ୍ରାଷ୍ଟ୍ରକଚରର ଏକ ଗବେଷଣାକାରୀ ଦଳ ପୃଥକ ତଥା ମିଶ୍ରିତ ବର୍ଜ୍ୟବସ୍ତୁର ମୂଲ୍ୟବାନ ଉତ୍ସ ପୁନରୁଦ୍ଧାର ପାଇଁ ଡିଜାଇନ୍ ହୋଇଥିବା ଏକ ଅଭିନବ ସୌରତାଡିତ ମାଇକ୍ରୋୱେଭ୍ ପାଇରୋଲିସିସ୍ ରିଆକ୍ଟର ଉଦ୍ଭାବନ କରିଛନ୍ତି। ସାମ୍ପ୍ରତିକ କଠିନ ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ଅଭ୍ୟାସଗୁଡ଼ିକ ମୁଖ୍ୟତଃ ଦହନ, ବାୟୋଗ୍ୟାସ୍ ପ୍ଲାଣ୍ଟ କିମ୍ବା ଲ୍ୟାଣ୍ଡଫିଲ୍ ନିଷ୍କାସନ ସହିତ ଜଡିତ, ଯାହାକି ପୁନଃବ୍ୟବହାର ପାଇଁ ସୀମିତ ସୁଯୋଗ ପ୍ରଦାନ କରେ। ଯଦିଓ ଦହନ ଲ୍ୟାଣ୍ଡଫିଲିଂର ଏକ ବିକଳ୍ପ, ଅନେକ ସମୟରେ ଏହା ଯୋଗୁଁ ବିପାକ୍ତ ଗ୍ୟାସ୍ ଏବଂ ପାଉଁଶ ନିଷ୍କାସିତ ହେବା ଦ୍ୱାରା ପରିବେଶ ପ୍ରଦୂଷଣର କାରଣ ହୋଇଥାଏ । ଗବେଷଣା ପ୍ରକଳ୍ପର ମୁଖ୍ୟ ଡକ୍ଟର ରେମ୍ୟା ମୀଣାଳତେରି କହିଛନ୍ତି। ଡକ୍ଟର ରେମ୍ୟା ଏହି ଟେକ୍ନୋଲୋଜିର କାର୍ଯ୍ୟ ପଦ୍ଧତିକୁ ବ୍ୟାଖ୍ୟା କରି କହିଛନ୍ତି ଯେ, ଉତ୍ପାଦିତ ପ୍ରଯୁକ୍ତିବିଦ୍ୟା ମାଇକ୍ରୋୱେଭ୍ ବିତରଣରୁ ଫିଡଷ୍ଟକ ମଧ୍ୟରେ ସମାନ ଉତ୍ତାପ ସୃଷ୍ଟି କରିବା ପାଇଁ ବ୍ୟବହାର କରିଥାଏ, ପ୍ରତିକ୍ରିୟାଗୁଡ଼ିକୁ ସଠିକ୍ ନିୟନ୍ତ୍ରଣ ସହିତ ଦ୍ରୁତ ଗତିରେ ମୂଲ୍ୟବାନ ଶେଷ ଦ୍ରବ୍ୟରେ ଦକ୍ଷ ରୂପାନ୍ତର କରିବାରେ ସକ୍ଷମ କରିଥାଏ। ଆହୁରି ମଧ୍ୟ, ଏହା ସୌର ଶକ୍ତି ଦ୍ୱାରା ପରିଚାଳିତ ହେଉଥିବାରୁ ଜୀଶାସି ଅତିରିକ୍ତ ଶକ୍ତିର ଆବଶ୍ୟକତା ନକରି ସ୍ଥିରତା ଏବଂ ଆତ୍ମନିର୍ଭରଶୀଳତା ନିଶ୍ଚିତ କରିଥାଏ। ଏହି ପରିବେଶ ଅନୁକୂଳ ବୈଷୟିକ ଜ୍ଞାନକୌଶଳ ଦହନ ଏବଂ ଅନ୍ୟାନ୍ୟ ପାରମ୍ପାରିକ ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ପଦ୍ଧତି ତୁଳନାରେ ସର୍ବନିମ୍ନ ପ୍ରଦୂଷଣ ସହିତ ମହତ୍ୱପୂର୍ଣ୍ଣ ରାଜସ୍ୱ ଉତ୍ପାଦନ କରିବାର କ୍ଷମତା ପ୍ରଦାନ କରି ସହର ମଧ୍ୟରେ ଥିବା ବିଭିନ୍ନ ସ୍ଥାନରେ ଯୌଉସଂସ୍ଥା ଏବଂ ଶିଳ୍ପସଂସ୍ଥା ଦ୍ୱାରା କାର୍ଯ୍ୟକାରୀ କରାଯାଇପାରିବ।

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	Saur Energy.com		
Date	22nd August, 2024	Language	English
Headline	IIT Bhubaneswar Develops Solar-Powered Reactor For Waste Management		
Link	https://www.saurenergy.com/solar-energy-news/iit-bhubaneswar-develops-solar-powered-reactor-for-waste-management		

Highlights :

- *The reactor uses microwave-assisted pyrolysis to rapidly convert waste into products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the characteristics of the feedstock and operating conditions.*

A research team from the School of Infrastructure at the Indian Institute of Technology (IIT) Bhubaneswar has developed a solar-powered microwave pyrolysis reactor. This reactor is designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics.

The reactor uses microwave-assisted pyrolysis to rapidly convert waste into products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the characteristics of the feedstock and operating conditions. Current solid waste management practices primarily involve incineration, biogas plants, or landfill disposal, offering limited opportunities for recycling. Incineration, while an alternative to landfilling, often leads to significant environmental pollution through the release of toxic gases and ashes. The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar represents a promising solution to these challenges.

"Microwave-assisted pyrolysis is a technology that produces valuable end products like biochar, bio-oil, and syngas in a very short amount of time, meeting the urgent need for sustainable waste management," said Remya Neelancherry, the lead researcher of the project.

"Our research at IIT Bhubaneswar is focused on the feasibility and applicability of these end products across various sectors, including agriculture, transportation, and energy production." An Indian patent has been granted for this technology.

Remya explains the technology's working principles, "This emerging technology utilizes microwave radiation to generate homogeneous heat within the feedstock, enabling efficient conversion into valuable end products at a faster rate with precise control over reactions. Furthermore, the reactor operates entirely on solar power, ensuring sustainability and self-reliance without imposing any additional energy demands."

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	The Indian Express		
Date	23rd August, 2024	Language	English
Headline	**IIT Bhubaneswar Researchers Develop Solar-Powered Microwave Pyrolysis Reactor for Sustainable Waste Management**		

IIT BHUBANESWAR RESEARCHERS DEVELOP SOLAR-POWERED MICROWAVE PYROLYSIS REACTOR FOR SUSTAINABLE WASTE MANAGEMENT

A research team from the School of Infrastructure at the Indian Institute of Technology (IIT) Bhubaneswar has developed an innovative solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics. The novel reactor uses microwave-assisted pyrolysis to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the characteristics of the feedstock and operating conditions.Current solid waste management practices primarily involve incineration, biogas plants, or landfill disposal, offering limited opportunities for recycling. Incineration, while an alternative to landfilling, often leads to significant environmental pollution through the release of toxic gases and ashes.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	The Pioneer		
Date	23rd August, 2024	Language	English
Headline	For Sustainable Waste Management : Solar-Powered Microwave Reactor developed at IIT Bhubaneswar		

For sustainable waste management

Solar-powered microwave reactor developed at IIT BBS

PNS ■ BHUBANESWAR

A research team from the School of Infrastructure at the Indian Institute of Technology (IIT) Bhubaneswar has developed an innovative solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics.

The novel reactor uses microwave-assisted pyrolysis to rapidly convert wastes into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the characteristics of the feedstock and operating conditions.

Current solid waste management practices primarily involve incineration, biogas plants or landfill disposal, offering limited opportunities for recycling. Incineration, while an alternative to landfilling, often leads to significant environmental pollution through the release of toxic gases and ashes.

The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar represents a promising solution to these challenges.

"Microwave-assisted pyrolysis is a technology that produces valuable end products like biochar, bio-oil and syngas in a very short amount of time, meeting the urgent need for sustainable waste management," said Dr Remya Neelancherry, the lead researcher of the project. "Our research is focused on the feasibility and applicability of these end products across various sectors, including agriculture, transportation, and energy production. Indian patent is granted on the mentioned technology," said he.

Dr Neelancherry explains the technology's working principles: "This emerging technology utilises microwave radiation to generate homogeneous heat within the feedstock, enabling efficient conversion into valuable end products at a faster rate with precise control over reactions. Furthermore, the reactor operates entirely on solar power, ensuring sustainability and self-reliance without imposing any additional energy demands."

This is a novel, mobile technology requiring minimal footprint area, capable of converting waste at a rate of 10 kg/h into high-value end-products. The ease of mobility promotes decentralised waste management. Moreover, the technology is carbon-neutral, offering investors a direct opportunity to generate carbon credits.

The end products of this process, biochar and bio-oil, have a wide range of applications, from healthcare to agriculture and industrial applications. Studies suggest that biochar could be a promising replacement for coal while bio-oil can serve as an alternative to petroleum products.

The conversion of high-heating-value refuse into these energy products can support efforts to achieve net-zero emissions and meet the IPCC's (Intergovernmental Panel on Climate Change) 2°C global warming challenge.

This environment-friendly technology can be implemented by municipalities and industries across various locations within cities, offering the potential to generate significant revenue with minimal pollution compared to incineration and other conventional waste management techniques.

"Depending on the waste management needs, this technology can be implemented in two forms: with a fixed bed reactor or a fluidised bed reactor. Research indicates promising potential for this technology to impact the alternative energy market positively. We welcome investors to explore this technology, ensuring environmental protection while fostering market growth," Dr Neelancherry concluded.

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	Dharitri		
Date	23rd August, 2024	Language	Odia
Headline	**IIT Bhubaneswar Researchers Develop Solar-Powered Microwave Pyrolysis Reactor for Sustainable Waste Management**		

ଆଇଆଇଟି ଭୁବନେଶ୍ୱରର ନୂତନ ଉଦ୍ଭାବନ

ସ୍ଥାୟୀ ବର୍ଜ୍ୟ ପରିଚାଳନା ପାଇଁ ସୌରଚାଳିତ ମାଇକ୍ରୋୱେଭ୍ ପାଇରୋଲିସିସ୍ ରିଆକ୍ଟର

ଭୁବନେଶ୍ୱର,୨୨।୮ (ଅନୁରାଧା ମହାଉଣା)

ଭାରତୀୟ ପ୍ରଯୁକ୍ତିବିଦ୍ୟା ପ୍ରତିଷ୍ଠାନ (ଆଇଆଇଟି) ଭୁବନେଶ୍ୱରର ଗବେଷଣାକାରୀଙ୍କ ଦ୍ୱାରା ସ୍ଥାୟୀ ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ପାଇଁ ସୌରଚାଳିତ ମାଇକ୍ରୋୱେଭ୍ ପାଇରୋଲିସିସ୍ ରିଆକ୍ଟର ବିକଶିତ କରାଯାଇଛି। ଶିକ୍ଷାନୁଷ୍ଠାନର ସ୍କୁଲ୍ ଅଫ୍ ଇନ୍ଫ୍ରାଷ୍ଟ୍ରକଚରର ଏକ ଗବେଷଣାକାରୀ ଦଳ ପୃଥକ୍ ତଥା ମିଶ୍ରିତ ବର୍ଜ୍ୟବସ୍ତୁରୁ ମୂଲ୍ୟବାନ୍ ଉତ୍ସ ପୁନରୁଦ୍ଧାର ପାଇଁ ଏହି ଉଦ୍ଭାବନ କରିଛନ୍ତି। ଏହି ନୂତନ ରିଆକ୍ଟରଟି ମାଇକ୍ରୋୱେଭ୍– ସହାୟକ ପାଇରୋଲିସିସ ବ୍ୟବହାର କରି ଫିଡ୍ ଷ୍ଟକ୍‌ର ବୈଶିଷ୍ଟ୍ୟ ଅନୁସାରେ କାର୍ବୋନେସିୟସ୍ ଉପାଦାନ (ବାୟୋଚାର) ଓ ବାୟୋଅଏଲ ଭଳି ବର୍ଜ୍ୟବସ୍ତୁରୁ ଉପଯୋଗୀ ଦ୍ରବ୍ୟରେ ପରିଣତ କରିଥାଏ। ବର୍ତ୍ତମାନ ମୁଖ୍ୟତଃ ଦହନ, ବାୟୋଗ୍ୟାସ ପ୍ଲାଣ୍ଟ ଜିମ୍ବା ଲ୍ୟାଣ୍ଡଫିଲ ନିଷ୍ପାସନ ଦ୍ୱାରା ଜଟିନ ବର୍ଜ୍ୟ ପରିଚାଳନା ଚ ର । ଯ । ଉ ଥି ବ । ବେ ବେ ପୁନଃବ୍ୟବହାର ପାଇଁ ସୀମିତ ସୁଯୋଗ ପ୍ରଦାନ କରେ। ଦହନ ଲ୍ୟାଣ୍ଡଫିଲିଂର ଏକ ବିକଳ୍ପ ହୋଇଥିଲେ ମଧ୍ୟ ଅନେକ ସମୟରେ ଏଥିରୁ ବିଷାକ୍ତ ଗ୍ୟାସ ଓ ପାଉଁଶ ନିଷ୍କାସିତ ହେବା ଦ୍ୱାରା ଏହା ପରିବେଶ ପ୍ରଦୂଷଣ କରିଥାଏ। ତେବେ ଆଇଆଇଟି ଭୁବନେଶ୍ୱର ଦ୍ୱାରା ବିକଶିତ ରିଆକ୍ଟର ଏହି ସମସ୍ୟାର ସମାଧାନ କରିବା ସହ ମୂଲ୍ୟବାନ୍ କ୍ଷେତ୍ର ଉତ୍ପାଦ ଉତ୍ପାଦନ କରିଥାଏ ବୋଲି ଗବେଷଣା ପ୍ରକଳ୍ପର ମୁଖ୍ୟ ଡ. ରେମ୍ୟା ନୀଲାମ୍‌ବେରି କହିଛନ୍ତି। ଏହି ପ୍ରଯୁକ୍ତି ବିଦ୍ୟା ଉପରେ ଭାରତୀୟ ପେଟେଣ୍ଟ ମଞ୍ଜୁର ହୋଇଛି। କୃଷି, ପରିବହନ ଏବଂ ଶକ୍ତି ଉତ୍ପାଦନ ସମେତ ବିଭିନ୍ନ କ୍ଷେତ୍ରରେ ଏହି କ୍ଷେତ୍ର ଉତ୍ପାଦଗୁଡ଼ିକର ସମ୍ଭାବ୍ୟତା ଏବଂ ପ୍ରୟୋଗିକତା ଉପରେ ଧ୍ୟାନ ଦିଆଯାଇଥିବା ସେ କହିଛନ୍ତି। ଏହି ପରିବେଶ ଅନୁକୂଳ ବୈଷୟିକ ଜ୍ଞାନକୌଶଳ ଦହନ ଓ ଅନ୍ୟ ପାରମ୍ପରିକ ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ପଦ୍ଧତି ତୁଳନାରେ ସର୍ବନିମ୍ନ ପ୍ରଦୂଷଣ ସହିତ ରାଜସ୍ୱ ସୃଷ୍ଟି କରୁଥିବାରୁ ସହର ମଧ୍ୟରେ ବିଭିନ୍ନ ସ୍ଥାନରେ ସୌରସଂସ୍ଥା ଓ ଶିଳ୍ପସଂସ୍ଥା ଦ୍ୱାରା କାର୍ଯ୍ୟକାରୀ କରାଯାଇପାରିବ।

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	The Prameya		
Date	23rd August, 2024	Language	Odia
Headline	**IIT Bhubaneswar Researchers Develop Solar-Powered Microwave Pyrolysis Reactor for Sustainable Waste Management**		

ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ପାଇଁ
ସୌରଚାଳିତ ମାଇକ୍ରୋୱେଭ୍ ରିଆକ୍ଟର ବିକଶିତ

ଜଟଣୀ,୨୨।୮(ଆପ୍ର): ଭାରତୀୟ ପ୍ରଯୁକ୍ତିବିଦ୍ୟା ପ୍ରତିଷ୍ଠାନ (ଆଇଆଇଟି)ର ଗବେଷକଙ୍କ ଦ୍ୱାରା ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ପାଇଁ ସୌରଚାଳିତ ମାଇକ୍ରୋୱେଭ ପାଇରୋଲିସିସ୍ ରିଆକ୍ଟର ବିକଶିତ କରାଯାଇଛି । ପ୍ରତିଷ୍ଠାନର ସ୍କୁଲ ଅଫ୍ ଇନ୍‌ଫ୍ରାଷ୍ଟ୍ରକଚର ଗବେଷଣାକାରୀ ଦଳ ପୃଥକ୍ ତଥା ମିଶ୍ରିତ ବର୍ଜ୍ୟବସ୍ତୁରୁ ମୂଲ୍ୟବାନ ପୁନରୁଦ୍ଧାର ପାଇଁ ଡିଜାଇନ୍ ହୋଇଥିବା ଅଭିନବ ସୌରଚାଳିକ ମାଇକ୍ରୋୱେଭ୍ ପାଇରୋଲିସିସ୍ ରିଆକ୍ଟର ବିକଶିତ କରିଛନ୍ତି । ଏହି ରିଆକ୍ଟର ମାଇକ୍ରୋୱେଭ୍ ସହାୟକ ପାଇରୋଲିସିସ୍ ବ୍ୟବହାର କରି ଫିଡ୍‌ଷ୍ଟକର ବୈଶିଷ୍ଟ୍ୟ ତଥା କାର୍ଯ୍ୟ ଅବସ୍ଥା ଉପରେ ନିର୍ଭର କରି ଦ୍ରୁତଗତିରେ କାର୍ବୋନେସିୟମ୍ ଉପାଦାନ ଓ ବାଇଓ ଅଏଲ୍ ଭଳି ବର୍ଜ୍ୟବସ୍ତୁକୁ ଉପଯୋଗୀ ଦ୍ରବ୍ୟରେ ରୂପାନ୍ତରୀଣ କରିଥାଏ । ଜଟିନ ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ପ୍ରଥା ମୁଖ୍ୟତଃ ଦହନ, ବାଇଓଗ୍ୟାସ ପ୍ଲାଣ୍ଟ ବା ଲ୍ୟାଣ୍ଡଫିଲ୍ ନିଷ୍କାସନ ସହିତ ଜଡ଼ିତ । ଯାହାକି ପୁନଃ ବ୍ୟବହାର ପାଇଁ ସୀମିତ ସୁଯୋଗ ପ୍ରଦାନ କରିଥାଏ । ଅନେକ ସମୟରେ ଏହା ଯୋଗୁଁ ବିଷାକ୍ତ ଗ୍ୟାସ ଓ ପାଉଁଶ ନିଷ୍କାସିତ ହେବା ଦ୍ୱାରା ପରିବେଶ ପ୍ରଦୂଷଣର କାରଣ ହୋଇଥାଏ । ଆଇଆଇଟି ଗବେଷକଙ୍କ ଦ୍ୱାରା ବିକଶିତ ମାଇକ୍ରୋୱେଭ୍ ସହାୟକ ପାଇରୋଲିସ୍ ଟେକ୍ନୋଲୋଜି ଆହ୍ୱାନଗୁଡିକର ଏକ ଉପଯୋଗୀ ସମାଧାନ କରିଥାଏ । ଗବେଷଣା ପ୍ରକଳ୍ପର ମୁଖ୍ୟ ଡ. ରେମିୟା ନୀଲାନ୍‌ଚେରୀ କହନ୍ତି ମାଇକ୍ରୋୱେଭ୍ ସହାୟକ ହୋଇଥିବା ପାଇରୋଲିସିସ୍ ହେଉଛି ଏକ ପ୍ରଯୁକ୍ତିବିଦ୍ୟା ।ଯାହା ବାଇଓଚାର, ବାଇଓଅଏଲ୍ ଓ ସିଙ୍ଗ୍ୟାସ ଭଳି ମୂଲ୍ୟବାନ୍ ଅନ୍ତିମ ଉତ୍ପାଦର ଉତ୍ପାଦନ କରିଥାଏ । ଯାହାକି ନିରନ୍ତନ ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ପାଇଁ ଆବଶ୍ୟକତାକୁ ପୂରଣ କରିଥାଏ ବୋଲି ସେ କହିଛନ୍ତି ।

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	Odisha Live.com		
Date	23rd August, 2024	Language	Odia
Headline	IIT Bhubaneswar develops new technology for Sustainable Waste Management		
Link	https://odisha.live/2024/08/23/iit-bhubaneswar-researchers-develop-solar-powered-microwave-pyrolysis-reactor-for-sustainable-waste-management-odia-news-odisha-news/		

ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ପାଇଁ ଆଇଆଇଟି ଭୁବନେଶ୍ୱରରେ ନୂଆ ଟେକ୍ନୋଲୋଜି ବିକଶିତ

ଆଇଆଇଟି ଭୁବନେଶ୍ୱରର ସ୍କୁଲ ଅଫ୍ ଇନଫ୍ରାଷ୍ଟ୍ରକଚରର ଗବେଷଣାକାରୀ ଦଳ ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା କ୍ଷେତ୍ରରେ ଏକ ନୂଆ ଟେକ୍ନୋଲୋଜି ଉଦ୍ଭାବନ କରିଛନ୍ତି। ଏଠାରେ ବର୍ଜ୍ୟବସ୍ତୁରୁ ମୂଲ୍ୟବାନ ଉତ୍ସ ପୁନରୁଦ୍ଧାର ପାଇଁ ଏକ ଅତ୍ୟାଧୁନିକ ସୌରଚାଳିତ ମାଇକ୍ରୋୱେଭ୍ ପାଇରୋଲିସିସ୍ ରିଆକ୍ଟରର ବିକାଶ ହୋଇଛି। ଏହି ଟେକ୍ନୋଲୋଜିକୁ ପେଟେଣ୍ଟ ମଧ୍ୟ ମିଳିଛି।

ଏହି ନୂଆ ରିଆକ୍ଟରଟି ମାଇକ୍ରୋୱେଭ୍-ସହାୟକ ପାଇରୋଲିସିସ୍ ବ୍ୟବହାର କରି ଦ୍ରୁତ ଗତିରେ କାର୍ବୋନେସିୟସ ଉପାଦାନ (ବାୟୋଚାର) ଓ ବାୟୋ-ଅଏଲ ଭଳି ବର୍ଜ୍ୟବସ୍ତୁକୁ ଉପଯୋଗୀ ଦ୍ରବ୍ୟରେ ପରିଣତ କରିଥାଏ। ଏଥିରୁ ବାହାରିଥିବା ଉତ୍ପାଦ କୃଷି, ପରିବହନ ଏବଂ ଶକ୍ତି ଉତ୍ପାଦନ ସମେତ ବିଭିନ୍ନ କ୍ଷେତ୍ରରେ ପୁଣି କାର୍ଯ୍ୟରେ ଲାଗି ପାରିବ।

“ସାମ୍ପ୍ରତିକ ପରିସ୍ଥିତିରେ କଠିନ ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ମୁଖ୍ୟତଃ ଦହନ, ବାୟୋଗ୍ୟାସ୍ ପ୍ଲାଣ୍ଟ କିମ୍ବା ଲ୍ୟାଣ୍ଡଫିଲ୍ ନିଷ୍କାସନ ସହିତ ଜଡିତ। ଏଥିରୁ ବାହାରୁ ଥିବା ଉତ୍ପାଦ ସୀମିତ ମାତ୍ରାରେ ପୁନଃବ୍ୟବହାର ଯୋଗ୍ୟ ହୋଇଥାଏ। ସେହିପରି ଦହନ ପ୍ରକ୍ରିୟାରେ ବର୍ଜ୍ୟବସ୍ତୁକୁ ଜଳାଇବା ଦ୍ୱାରା ଅନେକ ସମୟରେ ବିଷାକ୍ତ ଗ୍ୟାସ୍ ଏବଂ ପାଉଁଶ ବାହାରି ପରିବେଶ ପ୍ରଦୂଷଣର କାରଣ ହୋଇଥାଏ। ଏହି ସବୁ ସମସ୍ୟାଗୁଡ଼ିକୁ ଆଇଆଇଟି ଭୁବନେଶ୍ୱରର ନୂଆ ଟେକ୍ନୋଲୋଜି ସମାଧାନ କରିପାରିବ”, କହିଛନ୍ତି ଗବେଷଣା ଟିମର ମୁଖ୍ୟ ଡକ୍ଟର ରେମ୍ୟା ନୀଲାଞ୍ଜେରି।

ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ପାଇଁ ଏକ ପରିବେଶ ଅନୁକୂଳ ଏବଂ ସ୍ଥାୟୀ ଉପାୟ

ଏହି ଟେକ୍ନୋଲୋଜିରେ ମାଇକ୍ରୋୱେଭ୍ ବିକିରଣକୁ ଫିଡଷ୍ଟକ ମଧ୍ୟରେ ସମାନ ଉତ୍ତାପ ସୃଷ୍ଟି କରିବା ପାଇଁ ବ୍ୟବହାର କରିଥାଏ। ପ୍ରତିକ୍ରିୟାଗୁଡ଼ିକୁ ସଠିକ୍ ନିୟନ୍ତ୍ରଣ କରାଯିବା ସହିତ ବର୍ଜ୍ୟବସ୍ତୁ ଦ୍ରୁତ ଗତିରେ ମୂଲ୍ୟବାନ ଶେଷ ଦ୍ରବ୍ୟରେ ରୂପାନ୍ତରିତ ହୋଇଥାଏ। ଏହା ସୌର ଶକ୍ତି ଦ୍ୱାରା ପରିଚାଳିତ ହେଉଥିବାରୁ କୌଣସି ଅତିରିକ୍ତ ଶକ୍ତିର ଆବଶ୍ୟକତା ପଡ଼େ ନାହିଁ।

ଏହି ମେସିନ ଅଳ୍ପ ସ୍ଥାନରେ ଅଧିକ ମାତ୍ରାରେ ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା କରିବାରେ ସକ୍ଷମ। ଟେକ୍ନୋଲୋଜିଟି କାର୍ବନ ନିରପେକ୍ଷ ବା କାର୍ବନ ନିଉଟ୍ରାଲ୍, ଯାହାକି ନିବେଶକମାନଙ୍କୁ କାର୍ବନ କ୍ରେଡିଟ୍ ସୃଷ୍ଟି କରିବାର ସୁଯୋଗ ପ୍ରଦାନ କରିବ।

ଏହି ଟେକ୍ନୋଲୋଜି ଦହନ ଏବଂ ଅନ୍ୟାନ୍ୟ ପାରମ୍ପାରିକ ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ପଦ୍ଧତି ତୁଳନାରେ ସର୍ବନିମ୍ନ ପ୍ରଦୂଷଣ କରିଥାଏ। ଏଥିରେ କମ ଟଙ୍କା ଖର୍ଚ୍ଚ ହେଉଥିବାରୁ ବିଭିନ୍ନ ପୌରସଂସ୍ଥା ଏବଂ ଶିଳ୍ପସଂସ୍ଥା ଏହାର ଫାଇଦା ଉଠାଇ ପାରିବେ।

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	The Suryaprava		
Date	23rd August, 2024	Language	Odia
Headline	IIT Bhubaneswar develops reactor for Sustainable Waste Management		

ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ରିଆକ୍ଟର ବିକଶିତ

।। ପ୍ରଭାନ୍ୟୁଜ୍ ।। ଜଟଣୀ, ୨୫।୮: ଭାରତୀୟ ପ୍ରଯୁକ୍ତିବିଦ୍ୟା ପ୍ରତିଷ୍ଠାନ (ଆଇଆଇଟି) ଭୁବନେଶ୍ୱରର ସ୍କୁଲ ଅଫ୍ ଇନଫ୍ରାଷ୍ଟ୍ରକଚରର ଏକ ଗବେଷଣାକାରୀ ଦଳ ଏକ ପୃଥକ ତଥା ମିଶ୍ରିତ ବର୍ଜ୍ୟବସ୍ତୁରୁ ମୂଲ୍ୟବାନ ଉତ୍ସ ପୁନରୁଦ୍ଧାର ପାଇଁ ଡିଜାଇନ୍ ହୋଇଥିବା ଏକ ଅଭିନବ ସୌରଚାଳିତ ମାଇକ୍ରୋୱେଭ୍ ପାଇରୋଲିସିସ୍ ରିଆକ୍ଟରର ଉଦ୍ଭାବନ କରିଛନ୍ତି। ଏହି ନୂତନ ରିଆକ୍ଟରଟି ମାଇକ୍ରୋୱେଭ୍-ସହାୟକ ପାଇରୋଲିସିସ୍ ବ୍ୟବହାର କରି ଫିଡ୍ ଷ୍ଟକର ବୈଶିଷ୍ଟ୍ୟ ତଥା କାର୍ଯ୍ୟ ଅବସ୍ଥା ଉପରେ ନିର୍ଭର କରି ଦ୍ରୁତ ଗତିରେ କାର୍ବୋନେସିୟସ ଉପାଦାନ (ବାୟୋଚାର) ଓ ବାୟୋ-ଅଏଲ ଭଳି ବର୍ଜ୍ୟବସ୍ତୁକୁ ଉପଯୋଗୀ ଦ୍ରବ୍ୟରେ ପରିଣତ କରିଥାଏ। ଭୁବନେଶ୍ୱର ଦ୍ୱାରା ବିକଶିତ ମାଇକ୍ରୋୱେଭ୍-ସହାୟକ ପାଇରୋଲିସିସ୍ ଟେକ୍ନୋଲୋଜି ଏହି ଆହ୍ୱାନଗୁଡିକର ଏକ ଉପଯୋଗୀ ସମାଧାନର ପ୍ରତିନିଧିତ୍ୱ କରେ । ମାଇକ୍ରୋୱେଭ୍ ସହାୟକ ହୋଇଥିବା ପାଇରୋଲିସିସ୍ ହେଉଛି ଏକ ପ୍ରଯୁକ୍ତିବିଦ୍ୟା ଯାହା ବାୟୋଚାର, ବାୟୋ-ଅଏଲ ଏବଂ ସିଙ୍ଗସ୍ ଭଳି ମୂଲ୍ୟବାନ ଶେଷ ଉତ୍ପାଦ ଉତ୍ପାଦନ କରିଥାଏ, ଯାହାକି ନିରନ୍ତର ବର୍ଜ୍ୟବସ୍ତୁ ପରିଚାଳନା ପାଇଁ ଜରୁରୀ ଆବଶ୍ୟକତାକୁ ପୂରଣ କରିଥାଏ ବୋଲି ଗବେଷଣା ପ୍ରକଳ୍ପର ମୁଖ୍ୟ ଡକ୍ଟର ରେମ୍ୟା ନୀଲାନଚେରି କହିଛନ୍ତି ।

भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर
Indian Institute of Technology Bhubaneswar

Media/Publication	The Hans India.com		
Date	24th August, 2024	Language	English
Headline	IIT-Bhubaneswar develops solar-powered microwave reactor		
Link	https://www.thehansindia.com/news/national/iit-bhubaneswar-develops-solar-powered-microwave-reactor-901966		

The Hans India
Hans News Service | 24 Aug 2024 2:02 PM IST

HIGHLIGHTS

Are search team from the Indian Institute of Technology (IIT)- Bhubaneswar has developed a solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics.

Bhubaneswar: Are search team from the Indian Institute of Technology (IIT)- Bhubaneswar has developed a solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics. The reactor uses microwave-assisted pyrolysis to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the feedstock and operating conditions, the institute stated on Wednesday. Pyrolysis is the heating of an organic material, such as biomass, in the absence of oxygen.

Current solid waste management practices mainly involve incineration, biogas plants or landfill disposal, which offer limited recycling opportunities. While incineration serves as an alternative to landfilling, it often leads to significant environmental pollution through the release of toxic gases and ash, it said.

The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar's School of Infrastructure offers a promising solution to these challenges, the statement added. "Microwave-assisted pyrolysis produces valuable end products like biochar, bio-oil and syngas in a very short time, addressing the urgent need for sustainable waste management," said Remya Neelancherry, the lead researcher.

"Our research at IIT Bhubaneswar focuses on the feasibility and applicability of these products across various sectors, including agriculture, transportation and energy production," Neelancherry added. This environment-friendly technology can be implemented by municipalities and industries in various locations within cities, offering the potential for significant revenue generation with minimal pollution compared to incineration and other conventional waste management techniques, he said. Depending on waste management needs, the technology can be implemented with either a fixed bed reactor or a fluidised bed reactor, he added.