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1. New Energy Conversion and Management Findings from University of Texas Austin Discussed (Enabling Low-carbon/low-cost Electrified Ammonia Decomposition Reaction for Hydrogen Supply Applications: a Multi-step Assessment Approach)

New Energy Conversion and Management Findings from University of Texas Austin Discussed (Enabling Low-carbon/low-cost Electrified Ammonia Decomposition Reaction for Hydrogen Supply Applications: a Multi-step Assessment Approach)

Climate Change Daily News

March 20, 2025 Thursday

Section: ENERGY - ENERGY CONVERSION AND MANAGEMENT

Length: 672 words

Body

2025 MAR 20 (NewsRx) -- By a News Reporter-Staff News Editor at Climate Change Daily News -- Data detailed on Energy - Energy Conversion and Management have been presented. According to news reporting originating from Austin, Texas, by NewsRx correspondents, research stated, "Process electrification is a viable solution for reducing reliance on non-renewable fuels, with green ammonia considered as a promising hydrogen carrier with a gravimetric storage capacity of 17.6 wt%. The incorporation of these two direct COX-free energy systems inevitably facilitates enhanced environmental performance; however, extensive improvements are required to achieve cost-effectiveness."

Financial supporters for this research include ***Bureau of Economic Geology***, Ministry of Land, Infrastructure & Transport (MOLIT), Republic of Korea, Ministry of Trade, Industry & Energy (MOTIE), Republic of Korea.

Our news editors obtained a quote from the research from the University of Texas Austin, "Therefore, this study proposed and optimized the concept of electrified ammonia decomposition (AD) and evaluated it in terms of the technological, environmental, and economic feasibilities. To mitigate indirect CO2 emissions, a novel electrification process was proposed wherein a multi-concentric porous heater (MCPHs-AD) configuration was developed and compared to the natural gas heated (NGH-AD) process and the conventional electrically heated wall-adjacent heated reaction (WAH-AD.) A multi-step analysis approach was implemented, involving various scenarios of electricity sources (gray, blue, and green energy), to thoroughly assess the economic and environmental feasibility of the heat supply routes for the hydrogen refueling station. The non-feasibility of electrification was highlighted when using gray electricity owing to increased cost and CO2 emissions of 12.8 USD/kg-H2 and 10.5 kg-CO2/kg-H2, respectively. The application of CCS-integrated electricity reduced the carbon intensity by 14.3 % and 11.6 % for WAHAD and MCPHs-AD, respectively, compared to NGH-AD with up to 14.7 % increase in cost. For the 2050 scenario, green electricity implementation reduced the carbon emissions and cost to 10.7 USD/kg-H2 and 3.5 kg-CO2/kgH2 when using MCPHs-AD with up to 8.2 % decrease in carbon intensity compared to WAH-AD."

According to the news editors, the research concluded: "This achievement is attributable to the high energy efficiency because of the high surface area of the MCPHs-AD."

This research has been peer-reviewed.

For more information on this research see: Enabling Low-carbon/low-cost Electrified Ammonia Decomposition Reaction for Hydrogen Supply Applications: a Multi-step Assessment Approach. Energy Conversion and Management, 2025;328. Energy Conversion and Management can be contacted at: Pergamon-elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, England. (Elsevier - www.elsevier.com; Energy Conversion and Management - www.journals.elsevier.com/energy-conversion-and-management/)

The news editors report that additional information may be obtained by contacting Ali Cherif, University of Texas Austin, Bur Econ Geol, Austin, TX 78758, United States. Additional authors for this research include Ha-Jun Yoon, Chul-Jin Lee and Tesfalem Aregawi Atsbha.

The direct object identifier (DOI) for that additional information is: https://doi.org/10.1016/j.enconman.2025.119550. This DOI is a link to an online electronic document that is either free or for purchase, and can be your direct source for a journal article and its citation.

Keywords for this news article include: Austin, Texas, United States, North and Central America, Energy Conversion and Management, Energy, Ammonia, Carbon Dioxide, Climate Change, Co2 Emission, Co2 Emissions, Elements, Gases, Global Warming, Greenhouse Gases, Hydrogen, Inorganic Chemicals, Nitrogen Compounds, University of Texas Austin.

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