CO_2-free Hydrogen at 1/5th the Electrochemical Power Requirement

The reactor produces a profitable co-product with commercial balance-of-plant.

Morgantown, WVa, February 9, 2021: Catalyte LLC, assisted by computational modeling from BraneCell, has applied for a patent on the world's lowest cost electrochemical CO_2-free hydrogen, at 1/5th of the energy requirement of classical water electrolysis. The process abbreviated as, BCS, uses wind and solar in a unique way, starts from methane (either bio-methane or conventional) to produce zero CO_2, using an absolute minimal amount of water, while producing CO_2-negative-or-neutral H_2 at an attractive < 1 $/kg. Although, non-bio-methane is a fossil fuel, in the BCS process it ends up in the co-product, which never releases CO_2 to the atmosphere.

Dr. Christopher Papile, previous Head of the Global Renewable Task Force at thyssenkrupp and leader of BraneCell, is principal investigator working with Dr. Lauren Sammes---two internationally recognized H_2 experts.

Dr. Sammes is a graduate of Imperial College, London, and has worked in solid-state electrochemistry for a couple decades. She started her career in large-scale electrochemical plants (electro-chlorination), then at University of Connecticut was founding director of the Connecticut Global Fuel Cell Center and the United Technologies Corporation (UTC) Endowed Chair Professor in Materials. She was founding editor of the ASME Journal of Fuel Cell Science and Technology, while recently working with Papile on nano-structured quantum materials and novel green & blue hydrogen electrochemical reactors. Dr. Sammes mentions "two key factors for the successful worldwide energy transformation---*Energiewende*---are low wind and solar footprint and minimal use of clean water to produce CO_2-free hydrogen. Despite the rush to renewable-driven H2 world-wide, the BCS electrochemical method is the only process to avoid H2O use and minimize energy consumption to levels never before achieved."

Mr. Sydney Lobo, former Chief Collaboration Officer at TATA Power, now advisor to Catalyte, LLC: "Internationally, clean hydrogen as fuel and chemical raw material is undergoing unprecedented market growth with 10s of GW of solar and wind announced to drive water electrolysis. The BCS process would drastically improve the environmental care even compared with renewable-driven water electrolysis, since the BCS process averts > 18 Tons CO_2/Tons H_2, uses significantly less land, without impinging on marine life in any way, and already has a well-developed commercial balance-of-plant established. It will assist in decarbonization of steel through H_2 direct iron reduction…potential to reduce CO_2 global anthropogenic emissions by 7 %."

Catalyte, LLC and West Virginia University plan to continue the development of the related catalyst materials' turnover frequency and cell efficiency. The team is in discussion with and welcomes additional green hydrogen-interested multinationals and investors to partner in this near-commercial, green technology.

Catalyte, LLC and **BraneCell:** BraneCell has developed unique molecular qubit materials, a quantum processing system and quantum secure direct communication system for remote chemical plant optimization and other applications (financial technology, US Defense...). WVU is BraneCell's computational, clean room fabrication partner and Catalyte's electrochemical partner. BraneCell applies advanced computational modeling to a variety of applications including to the international chemical process industry towards CO_2-free---in process modeling, molecular modeling, process controls and EPC Industry 4.0; in this way, Catalyte LLC and BraneCell are synergistic. Catalyte, LLC a Massachusetts limited liability company, founded in 1999, is the owner of BraneCell, LLC and Catalyte develops and consults on processes and catalysts for hydrogen, green ammonia, polycarbonate and related monomers and polymers. CONTACT: Lydia: +1 857 529 7151 | One@BraneCell.com | or Roland: Roland@Catalyte.com | www.Catalyte.com | www.BraneCell.com

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