

Application of a two-stage polymeric membrane system for capturing CO₂ from simulated power plant flue gases

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Abstract:

This work is part of a circular economy LIFE project (acronym: CO₂toCH₄) which aims to develop and demonstrate an innovative hybrid energy storage unit, based on renewable energy sources (RES) and the Capture, Sequestration and Utilization of carbon dioxide (CCSU) from typical power plant flue/waste gases, burning fossil fuels. This prototype pilot unit will consist of three sub-units: (1) an electrolyser for the production of green hydrogen from water electrolysis, by using preferentially RES, (2) a flue gas purification sub-unit for the effective separation of CO₂ from the flue gases, leading to a CO₂-rich gaseous stream, and (3) an ex-situ bi-methanation unit for the conversion of CO₂ to methane, with the use of appropriate microorganisms and after its reaction with the H₂ obtained from the electrolyser. The present work focuses mainly on the construction, installation and operation of the second integral sub-unit of the aforementioned prototype pilot unit, which aims at the effective capturing of CO₂. This sub-unit will be composed from a two-stage polymeric membrane system and is expected to yield a gas stream with a CO₂ purity of 75-80%.

Keywords

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