A Novel Electrochemical Approach to Sustainable NOx Reduction from Diluted Gas Streams

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NOx, as key contributor to air pollution originating from fossil fuel combustion, pose severe implications for global warming and air quality. Their conversion has been implemented in transportation and in many industrial processes, but typically requires stoichiometric amounts of ammonia or urea to proceed. In the current work, we propose to transform these into a useful product, ammonia, using an innovative electrocatalytic process. This offers an environmentally-friendly alternative to the energy-intensive and carbon dioxide-producing Haber-Bosch method for ammonia generation, while contributing to a flue gas waste removal process. Traditional issues with electrochemical NOx reduction, primarily the low concentration in gas streams, have been here overcome by employing a membrane-electrode-assembly-electrolyzer, enabling us to perform the reaction directly in a diluted NOx gas stream. The applied catalyst demonstrated a promising yield rate of 0.45 mmol/h*cm^2, successfully converting up to 83% of NOx in the gas stream to ammonia.