

Protic ionic liquids as electrolyte for electrochemical CO₂ reduction

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Abstract

Ionic liquids have been considered a promising material under investigation for integration of CO₂ capture and electrochemical reduction, due to their recognized sustainability and tunable properties. During previous works, the development of an electrochemical process to produce syngas (CO+H₂) using electrolytes based on 1-ethyl-3-methyl-imidazolium trifluoromethanesulfate [EMIM][OTf] was reported [1-2]. A more recent work reported the effect of replacing the 1-ethyl-3-methyl-imidazolium cation [EMIM] by 1-ethyl-3-picolinium [C₂-3-pic] and 1-ethyl-4-picolinium [C₂-4-pic] cations as electrolyte for electrochemical reduction of CO₂ at pressures higher than atmospheric [3]. The objective of this work is to study the influence of protic ionic liquids-based electrolytes in electrochemical CO₂ reduction. In this context, protic ionic liquids prepared by direct protonation of different imidazolium compounds using suitable organic acids have been investigated. All electrolytes are characterized by cyclic voltammetry and electrochemical impedance spectroscopy to evaluate their electrochemistry behavior for CO₂ electroreduction processes. Productivities of gaseous products resulting from the co-electrolysis of CO₂ and water together with their faradaic efficiencies have been also determined.

Keywords: Electrochemical, CO₂, Ionic Liquids.

References:

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