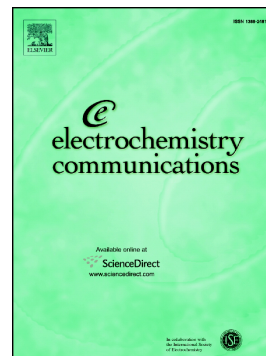


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Monoethanolamine-enabled electrochemical detection of H₂S in a hydroxyl-functionalized ionic liquid

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Abstract

There is much interest in developing electrochemical sensors for H₂S detection using room temperature ionic liquids as electrolytes. To this end, this study compared the electrochemical behavior at a Pt-microdisk electrode of H₂S in [Bmim]BF₄, [C₃OHmim]BF₄, and MEA–[C₃OHmim]BF₄ (1:6.2 molar ratio) using cyclic voltammetry. In both [Bmim]BF₄ and [C₃OHmim]BF₄, the electrochemical oxidation/reduction of H₂S requires too high/low a potential (about 1.5/–1.6 V vs. Ag/Ag⁺), and these ionic liquids are therefore unsuitable for H₂S detection. Addition of monoethanolamine (MEA) to [C₃OHmim]BF₄ significantly increases the H₂S absorption capacity through the chemical reaction between MEA and H₂S. This chemical absorption enhances the electrochemical response of H₂S, in particular generating electroactive HS[–] ions that lead to an additional and independent anodic peak at around –0.4 V vs Ag/Ag⁺ which is suitable for H₂S sensing. There is a good linear relationship between the peak current and H₂S

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