

Electrocatalytic Methane Oxidation at Ambient Temperature

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Since methane is the main component for natural gas, methane has been widely studied as an useful energy source. However, CH₄ activation is a challenging process due to its strong C-H bond energy and lack of polarity. Here, I studied CH₄ activation via introducing electrochemical system using electrochemical catalyst, NiCo₂O₄/ZrO₂ nanocomposite which facilitate CH₄ oxidation.

Electrochemical performance test: LSV test was conducted in a three-electrode system with a glassy carbon electrode as the working electrode, Ag/AgCl as the reference electrode, a Pt foil as the counter electrode and 0.5 M Na₂CO₃ solution as the electrolyte. The electrochemical conversion of CH₄ was conducted in a two-electrode system with a closed reactor, employing graphite foil as the working electrode, Pt foil as the counter electrode and 50ml 0.5 M Na₂CO₃ solution as the electrolyte.

The NiCo₂O₄/ZrO₂ samples shows high catalytic activity in LSV measurement. The products were collected after reaction for 5 h, 12 h and 20 h. The main products were 1-propanol and 2-propanol.