

Spontaneous CO₂ reduction with sacrificial aluminum electrode

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Carbon dioxide (CO₂) has been considered as a green-house gas which causes environmental problems such as global warming. Meanwhile, CO₂ is a sustainable carbon feedstock which can be used to produce value-added products. To date, the field of electrochemical CO₂ reduction has attracted interest because it can convert CO₂ to other useful compounds. However, electrochemical reduction of CO₂ has occurred by supplying continuous electrical power and applying overpotential. Here, we have prepared Al electrode to use sacrificial electrode. The standard reduction potential of Al is - 1.66 V which has more negative potential than other standard reduction potential of CO₂. Namely, Al electrode is oxidized to Al³⁺ ions and CO₂ is reduced to value-added compounds (CH₄, C₂H₄). Since this reaction is spontaneous reaction, applying continuous overpotential is not essential. The changes of electrodes are characterized by X-ray diffraction (XRD) and X-ray photo electron spectroscopy (XPS). The electrochemical performances are evaluated by linear sweep voltammetry (LSV). Also, the products of reaction are characterized by Gas chromatography (GC) and Liquid chromatography (LC).