CYCLE DE CONFÉRENCES DE CHIMIE

Avec le concours de : Université Clermont Auvergne
INP Clermont Auvergne

Mercredi 6 mars à 16 h (hors cycle)

Amphi Rémi (site des Cézeaux)

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Fluorine production and fluoride materials for energy applications

Fluorine gas is industrially produced by electrolysis of KF-2HF molten salt around 90 ºC. The small-scale use of F_2 gas has recently been required in some academic and industrial spots, and a small F_2 gas generator is suitable for such purposes. However, miniaturization of the present electrolytic cell is difficult, since it requires large peripheral equipment to control the conditions of the electrolytic cell. The present study proposes a new method to produce F_2 gas by electrolysis of CsF-*n*HF molten salt containing metal fluoride at room temperature for the small-scale use. The cathode and anode reactions are reduction of metal fluoride to metal and oxidation of F^- to F_2 gas, respectively, giving the total reaction from metal fluoride to metal and F_2 gas. The cathodic reaction without H_2 gas generation significantly improves the safety of the electrolytic cell.

Realization of versatile applications through exploration of functional materials is important to attain a new level of sustainable society. Fluorine plays an important role in a variety of applicational fields owing to its unique properties including the high electronegativity and small radius. Fluoride materials in battery application are widely pursued as they tend to offer a high voltage cell. In this talk, the application of fluoride materials in battery fields will be described. In particular, improvement of charge-discharge performance of high potential positive electrodes which are not active at room temperature is discussed via the use of thermally stable ionic liquid electrolytes. Introduction of fluorine into oxide materials provides oxyfluoride materials which can give new functions compared to the parental oxides, but an appropriate fluorination technique is necessary depending on the application. Different fluorination methods to oxide materials are also discussed in this talk, including the ones by hydrogen fluoride, elemental fluorine, and polymer decomposition.

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