

Novel Fe–Mn oxide positive electrode for rechargeable lithium battery

Novel Fe-Mn oxide positive electrode materials with high capacity (150mAh/g) and superior high temperature (60 °C) cycle performance has been developed through the combination of material design fully utilizing Fe ion with novel synthetic route for getting homogeneous and fine particles (<100nm). The material belongs a $\text{LiFeO}_2\text{-Li}_2\text{MnO}_3$ solid solution and could be expressed as $\text{Li}_{1+x}(\text{Fe}_{0.5-y}\text{Mn}_{0.5-y}\text{Ni}_{2y})_{1-x}\text{O}_2$ ($0 < x < 1/3$, $y = 0$ or 0.1). The synthetic route consists of three steps; coprecipitation, hydrothermal and post heat-treatment processes for complete mixing of two or three transition metal ions. As iron resource is available abundantly, it will open the way to the development of low cost lithium ion battery.

Mitsuharu Tabuchi
Research Institute for
Ubiquitous Energy Devices
E-mail: m-tabuchi@aist.go.jp

AIST Today
Vol.5, No.2 (2005) 27

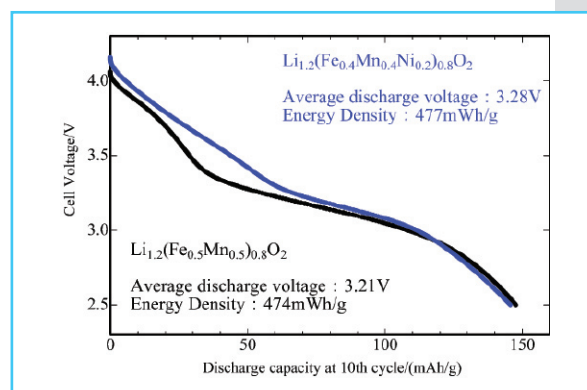


Fig. Discharge curves of two newly developed positive electrode materials against carbon negative electrode after 10 cycles following charging up to 4.3 V at 60 °C.

Decomposition of environmentally persistent perfluorocarboxylic acids by a heteropolyacid photocatalyst

Perfluorocarboxylic acids have been widely used in industrial applications such as surfactants. The use of these compounds has steadily increased, and some of them have detected in the environment. Hence, it is desirable to develop an artificial method for decomposing these compounds to environmentally harmless species under mild conditions as a measure against stationary sources.

We developed the effective decomposition method for perfluorocarboxylic acids such as perfluorooctanoic acid (PFOA), using a homogeneous system consisting of the heteropolyacid photocatalyst, water, and oxygen. Most of the PFOAs are transformed into F^- and CO_2 .

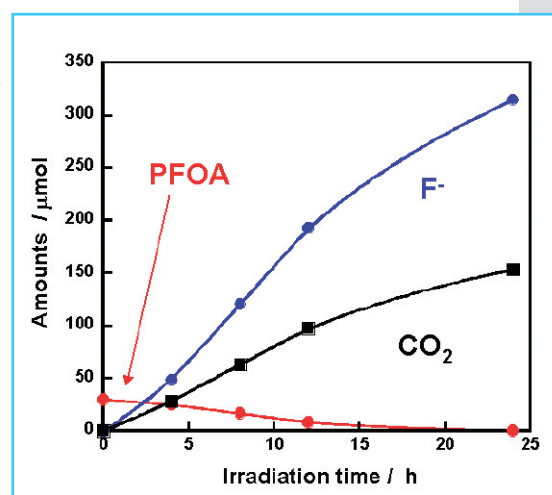


Fig. Irradiation time dependence of the PFOA decomposition. [Reprinted with permission from Environ. Sci. Technol. 2004, 38, 6118. Copyright 2004 American Chemical Society]

Hisao Hori
Research Institute
for Environmental
Management Technology
E-mail: h-hori@aist.go.jp

AIST Today
Vol.5, No.2 (2005) 28