Preparation and Electrochemical Properties of Macroporous LDH Contained Transition Metal in Frameworks

大学院自然科学研究科　講師　鯉沼陸央
〃　前期課程　岡山寛子
〃　教授　松本泰道

Abstract:
Ordered macropous materials are attractive in many fields including catalysis, thermal and acoustic insulator, chemical sensors, and molecular sieving. The self-assembled template replication process named inverse opal (IO) has proven to be a promising approach for the fabrication of three dimensionally (3D), high ordered macroporous materials, which are composed of air spheres and solid frameworks.
The anionic clays, layered double hydroxide (LDH) posses a layered structure of general formula: $[M^{II}_{1-x}M^{III}_{x}(OH)_2]^{x+}[X^{q-}_{x/q}(H_2O)_n]^{x-}$ that can be described by comparison to brucite-like layers. The positive charge created by the substitution of part the divalent cations by trivalent cations is compensated by the presence of anion in the interlayer spaces.
LDHs are useful in various fields of application sue to their ability to exchange anions and their behavior as inorganic base. Since most of application where LDH type materials are concerned (catalysis, adsorption, biomolecule immobilization, and so on) hinges on reactions at the interface solid/liquid and solid/gas, there is a great interest in LDHs which have large surface areas because of increasing the diffusion properties as well as the accessibility to the active sites in the materials. To date, V. Prevot et al.1) succeeded in the preparation of Mg-Al LDH with macropourous structure. However, the macroporous Mg-Al KDH which they synthesized can not be applied to the electrochemistry measurement, because the conductivity is very low. In this work, we prepared the macropourous LDH which contains transition metal to give conductivity to LDH in the frameworks.

[Pacific Rim Meeting on Electrochemical and Solid-State Science 2008 (PRiME 2008, 2008 年電気化学日米合同大会), 2008.10]