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Electronic Properties of Alkali-Metal-Hydrogen-Graphite Intercalation Compounds*

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Alkali-metal-hydrogen-graphite intercalation compounds (GIC) are classified to be a metal-hydrogen system. Electronic properties have been investigated by means of conductivities and thermoelectric powers for isostructural sodium-hydride (NaH) and potassium-mercury (KHg)-GICs having alkali-metal-hydrogen/mercury-alkali-metal sandwiched triple atomic layers in graphitic galleries, in comparison with an isostructural KH-GIC. From the experimental results, it is suggested that carrier concentrations in intercalate layers decrease in the order of KHg-GIC > KH-GIC > NaH-GIC, so that the electronic structure of hydrogen/mercury varies from delocalized to localized one in the same order.

1. Introduction

Graphite intercalation compounds (GIC) are metallic compounds consisting of host graphite and guest materials intercalated in graphitic galleries. GICs having guest layers in every graphitic gallery are called stage-1 compounds, while those with guest layers in every n graphitic gallery are stage-n compounds. Among GICs, alkali-metal-GICs absorb hydrogen in graphitic galleries through the chemisorption process [1]. The absorbed hydrogen stabilized in the graphitic galleries forms a hydrogen anion H^- through the dissociation and charge transfer processes. These hydrogen-chemisorbed alkali-metal-GICs, which are considered to be alkali-metal-hydride intercalated graphite, are classified to be one kind of metal-hydrogen system. We have investigated the electronic structures and the structures of the hydrogen-absorbed alkali-GICs by means of experimental techniques for electronic, magnetic and structural properties [1 – 5]. The experimental

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