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R. Chianelli

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NOVEL PROPERTIES OF AMORPHOUS TRANSITION METAL SULFIDES

R. Chianelli

Exxon Research & Engineering Co., Linden, NJ, U.S.A.

Abstract.—Crystalline chalcogenides of transition metals of groups IV-VI B (Ti, Zr, Hf, V, Nb, Ta, Mo, W) occur with layer-like structures for the MX$_2$ stoichiometry and with chain-like structures for the MX$_3$ stoichiometry. Recently, amorphous analogs of these compounds have been obtained by low temperature precipitation from non-aqueous solutions and/or by chemical reaction and thermal decomposition of chalcogen containing salts. The properties of these amorphous sulfides are often strikingly different from their crystalline counterparts where they exist. These novel properties make these materials potentially useful in energy related areas. In this paper we discuss the preparation, characterization, structure and properties of this class of materials /1/. We shall also discuss electrochemical studies which have indicated that amorphous MoS$_3$ is an attractive electrode material for high energy density secondary battery systems. Experimental results of amorphous Li$_x$MoS$_3$ (0 ≤ x ≤ 4) using X-ray RDF, EXAFS, XPS, and magnetic susceptibility measurements will be presented. Mechanism of Li intercalation into MoS$_3$ will be discussed.

Reference