

ELECTROCHEMICAL REDUCTION OF BORON IONS IN MOLTEN FLINAK

Elisabete J. Pessine and Gerhard Ett

Instituto de Pesquisas Energéticas e Nucleares-IPEN-CNEN,MM
Caixa Postal 11049 São Paulo-SP, Brasil.

Abstract

Thinking in the preparation of diborides cathodic deposits from refractory metals like Ti or Zr in molten fluoride medium is of fundamental importance to know the mechanism of the boron electrodeposition process. Makyta (1) has shown using molten mixtures of LiF-KF-KBF₄, at 700°C over Pt electrode that boron deposition process occurs in only one step of three electron. Wendt (2) using Flinak and KBF₄, at 700°C over Cu electrode has shown that the boron deposition process occurs in one step also. Both these authors suggest an intermetallic formation with the metallic work electrode where they have been used a Pt (pseudo-reference) or a dynamic Cu as the reference electrode.

Grjotyheim (3) suggests the use of Ni/Ni(II) pair as a reference electrode as a result from the difficulties in knowing precisely the potentials in fluoride's medium. Mamantov (4) uses this pair inside a boron nitride tube in measuring EMF in the same medium.

In this communication the concentration ranges of the electroactive specie B(III) ion was changed among 2 and 4 mol % and verified that elemental boron is a one step of three electrons charge transfer electrodeposition process and reaction rate is under diffusion control of the electroactive specie. The reference electrode used was the Ni/Ni(II) pair inside a boron nitride separation membrane with an internal graphite wall (5,6) to restrict the ion diffusion into electrolytes at only one point.

The voltammograms obtained and microstructural analysis indicated an interaction between the electrodeposited boron and the copper surface electrode.

TRABALHO APRESENTADO TRABALHO APRESENTADO NO
"185TH MEETING THE ELECTROCHEMICAL SOCIETY".
SÃO-FRANSISCO-USA, 22-27 DE MAIO DE 1994