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Formiranje Nb taloga na staklastom ugljeniku iz hloroaluminatnog rastopa

Formation of Nb deposit on vitrius carbon from chloroaluminate melts

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Izvod

Ispitivano je elektrohemijsko taloženje i rastvaranje niobijuma iz rastopa ekvimolarne smeše aluminijum (III) hlorida i natrijum hlorida, obogaćenog niobijumom, na staklastom ugljeniku. Elektrotaloženje je izvođeno u atmosferi argona, na temperaturi od 200^{0}C. Potrebna količina niobijumovih jona, u rastop ekvimolarne smeše $AlCl_3$+NaCl, obezbeđivana je anodnim rastvaranjem niobijuma ili hemijskim rastvaranjem Nb_2O_5. Elektrohemijske tehnike linearne cikličke voltametrije i hronoamperometrije korišćene su za praćenje procesa rastvaranja i taloženja niobijuma i aluminijuma. Karakterizacija dobijenog depozita vršena je skenirajućom elektronskom mikroskopijom (SEM) i energetskom disperzivnom spektroskopijom (EDS). Utvrđeno je da se redukcija niobijuma (bez obrzira na izvor Nb jona u rastopu) u načelu odvija u dva koraka nakon čega sledi zajedničko taloženje aluminijuma i niobijuma. Talog se formira samostalnim taloženjam Nb, ali i zajedničkim taloženjem Nb i Al uz formiranje legura na površini radne elektrode od staklastog ugljenika. Uočen je i uticaj izvora niobijumovih jona, u rastopu, na potencijale elektrotaloženja Nb, Al i njihovih legura.

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Abstract

Niobium and aluminium have been electrodeposited onto vitreous carbon from melt made of equimolar mixture ($AlCl_3$+NaCl) enriched with niobium. The deposition was performed under argon atmosphere at 200^{0}C. Desired quantity of niobium was introduced into electrolyte by anodic dissolution of metallic niobium or by chemical dissolution of Nb_2O_5. The processes of deposition/dissolution of niobium and aluminium on vitreous carbon were investigated by cyclic voltammetry and chronoamperometry. Characterization of the obtained deposits was done by Scanning Electron Microscopy (SEM) and Energy Dispersive Spectroscopy (EDS).

It was established that the reduction of niobium ions (irrespective of their origin) generally proceeds in two steps, after which follows aluminium-niobium codeposition. The first reduction step of niobium ions obtained from anodically dissolved Nb metal reduction is not always very well pronounced. Depending on potential applied it was possible to obtain either only Nb metal deposit or Al-Nb codeposit/alloys with different participation of aluminium. Metal deposition potentials depended on the niobium ions source.

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