BOOK of ABSTRACTS

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Correlation Between Morphology and Structure of Galvanostatically Electrodeposited Tin Dendrites

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Tin dendrites found wide application in various industries.[1] They can be obtained by both non-electrochemical and electrochemical methods of synthesis. In this study, they were produced by a galvanostatic regime of electrolysis from alkaline hydroxide solution at a current density of –3 mA cm^{-2}, 1.5 times larger than the limiting diffusion current density, with an amount of the electricity of 200 and 400 mC. In the dependence of an amount of the passed electricity, Sn dendrites of various morphology and crystal orientation were obtained: the fern-like dendrites predominantly oriented in (220), (440) crystal planes are obtained with 200 mC and the spear-like and the dendrites with prismatic branches showing the strong (200),(400) preferred orientationwere obtained with 400 mC.

The strong correlation between morphology and structure of Sn dendrites is established and it can be explained by analysis of chronopotentiometry response obtained at the given current density and by morphological and structural analyses of Sn dendrites obtained by a potentiostatic regime at cathodic potentials corresponding to values attained after the passed amount of the electricity of 200 and 400 mC. The chronopotentiometry response after spent 200 mC was dominantly in the (–1600 ÷– 1740) mV vs. Ag/AgCl range, and the fern-like dendrites with the strong (220), (440) preferred orientation were obtained in this potential range. After spent 400 mC, the chronopotentiometry response was about –1200 mV vs. Ag/AgCl, and the spear-like and the dendrites with prismatic branches with the strong (200),(400) preferred orientationwere obtained at this cathodic potential.

Keywords: tin; electrolysis; morphology; structure; dendrite.

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References

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