

## Tin and Tin-Copper Composite Nanorod Anodes for Rechargeable Lithium Applications

**Authors :** B. D. Polat, Ö. Keleş

**Abstract :** Physical vapor deposition under conditions of an obliquely incident flux results in a film formation with an inclined columnar structure. These columns will be oriented toward the vapor source because of the self-shadowing effect, and they are homogeneously distributed on the substrate surface because of the limited surface diffusion ability of ad-atoms when there is no additional substrate heating. In this work, the oblique angle electron beam evaporation technique is used to fabricate thin films containing inclined nanorods. The results demonstrate that depending on the thin film composition, the morphology of the nanorods changed as well. The galvanostatic analysis of these thin film anodes reveals that a composite CuSn nanorods having approximately 900mAhg<sup>-1</sup> of initial discharge capacity, performs higher electrochemical performance compared to pure Sn nanorods containing anode material. The long cycle life and the advanced electrochemical properties of the nano-structured composite electrode might be attributed to its improved mechanical tolerance and enhanced electrical conductivity depending on the Cu presence in the nanorods.

**Keywords :** Cu-Sn thin film, oblique angle deposition, lithium ion batteries, anode

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