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Porosification of III–V and II–VI Semiconductor Compounds

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Abstract

We report on a comparative study of the pore growth during anodization of a narrow-bandgap III–V compound (InAs), a medium-bandgap III–V one (InP) and wide-bandgap II–VI semiconductors (ZnSe and Zn_{0.4}Cd_{0.6}S). According to the obtained results, the morphology of the porous layers can be controlled by the composition of the electrolyte and the applied electrochemical parameters. It was evidenced that in the narrow bandgap semiconductor InAs it is difficult to control the mechanism of pore growth. Both current-line oriented pores and crystallographically oriented pores were produced in the medium-bandgap material InP. The electrochemical nanostructuring of wide-bandgap semiconductors realized in single crystalline high-conductivity samples evidenced only current-line oriented pores. This behavior is explained in terms of difference in the values of electronegativity of the constituent atoms and the degree of ionicity.