

Formation and properties of porous silicon/titania nanostructures

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Abstract

Porous silicon/titania structures have been prepared for the first time by a sol-gel process in which a porous silicon layer was produced on single-crystal *p*-type silicon wafers and the titania was obtained from Ti-containing sol. The formation of TiO₂, predominantly in the form of anatase, on the porous silicon surface was demonstrated by X-ray diffraction and energy dispersive X-ray analysis. The porous layers were found to contain carbon in addition to the host elements (Si, Ti, and O). Increasing the pore volume through the thermal oxidation of the porous silicon and dissolution of the oxide layer had little effect on the final Ti content, whereas the average pore diameter increased twofold, and the photoluminescence intensity in the porous silicon increased by 20 times.

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