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Title:Nanostructured porous silicon films for terahertz optics

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Abstract: A simple technique is reported to create 31 and 45μm thick, graded-index Si films in the form of nanospirals on a Si substrate using a dynamic, oblique angle deposition technique. We show that the success in producing such a thick, nanostructured film without delamination from the Si substrate is primarily due to the nano-porous nature of the film which effectively eliminates the stress generated during growth. Effective refractive indices of 1.9 and 2.1 were extracted from the terahertz time-domain reflectivity data, which correspond to 57% and 51% porosity for the 31 and 45μm thick films, respectively. The gradient of porosity through the film was modeled to describe quantitatively the terahertz reflectance data in the 0.2-2.0THz regime. © 2012 IOP Publishing Ltd.

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