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Anisotropic Bragg mirror made from one single material used for polarized laser emission from a Yb-doped YAG ceramic

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We propose a novel anisotropic Bragg mirror made of alternating high- and low-index layers of one single material, of which the refractive index is controlled by changing the angle between the sample normal and the average direction of the evaporated material during the deposition process, a technique called glancing angle deposition or GLAD, which affects the nanoporosity and hence the refractive index of the material [1-3]. By changing the incidence angle of the deposition, we could change the refractive index of a tungsten trioxide WO3 by as much as 0.3 and obtain a birefringence, Δn, as high as 0.08, as measured with ellipsometry. Next, we could exploit the anisotropy of the layers to fabricate linear polarizers which, when applied as output coupler to a Yb3+-doped YAG ceramic material, could produce linearly polarized laser output with high extinction ratio. This fabrication technique can be used to deposit such coating directly on the facets of a cheap ceramic isotropic laser material and thereby produce a monolithic linearly polarized laser microchip. It allows one to avoid the costly steps of etching regular linear ridges into an isotropic Bragg mirror to form a resonant grating mirror, as previously proposed in Ref. [4]. The fabrication technique, the optical properties of othe produced coatings and the properties of the laser output obtained by placing such coating on a laser material will be presented.

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