Bragg reflectors in the visible region fabricated from multilayered porous silicon

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Porous silicon has been studied in several applications such as microelectronics, optoelectronics, chemical and biological sensors, batteries, solar cells and biomedical devices. There are several methods for obtaining porous silicon, but the conventional method is through an electrochemical etching from a crystalline silicon wafer in hydrofluoric acid solution. Since in the electrochemical etching of the porous silicon the current flows preferentially toward the deepest pores it is possible to produce dozens layers of different refractive index by modulating the current density during the etching [1,2].

In this work, Bragg mirrors were fabricated from p-type silicon wafer (100) of low resistivity (0.01 – 0.02 Ω.cm) in hydrofluoric acid solution (48%). Bragg mirrors is based on light interference from different layers. It is formed by the superposition of multiple layers with alternating refractive index. By the choice of the thickness and the refractive index of each layer it is possible to produce a high quality reflector in the photonic stopband.

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References

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