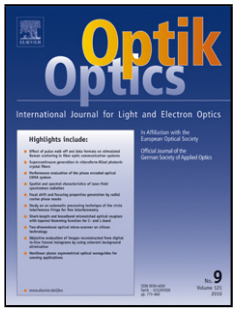

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Effects of etching time towards broadband absorption enhancement in black silicon fabricated by silver-assisted chemical etching

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ABSTRACT

This paper presents investigation on the effects of etching time towards broadband absorption enhancement in black silicon (b-Si) fabricated by silver-assisted chemical etching. The c-Si wafers are deposited with a thin silver (Ag) layer and annealed in a nitrogen (N_2) atmosphere to form Ag nanoparticles (Ag NPs). The wafers are then etched in an aqueous solution of HF:H_2O_2:H_2O at room temperature at different etching times to form the b-Si. All the b-Si wafers show rough surface morphology due to the presence of nanotextures. The b-Si exhibit wafers exhibit significantly lower broadband reflection compared to a planar c-Si reference. The c-Si wafer etched for 70 s demonstrates the lowest broadband reflection, with reflection of 3% at wavelength of 600 nm (i.e. absorption of 97%). This sample exhibits b-Si nanotextures with width of 50-100 nm and height of 300-400 nm. The enhanced broadband light absorption in the b-Si leads to