Fabrication of Random Metal Nanostructures Based on Macroporous Silicon

(26 August 2015)

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The speaker is going to discuss his and his research group's recent work related to macroporous silicon.

Macroporous silicon is produced by electrochemical etching of silicon, with pore diameters in the range of sub-micrometers up to several micrometers. Moreover, pores having large diameter variations on the length scale of the interpore distance can also be achieved, allowing the fabrication of complex three-dimensional structures like photonic crystals.

Macroporous silicon itself can be used as semiconductors (such as silicon solar cells). Besides, it can also be used as templates. By depositing a thin iron layer on arrays of cones which are replicated from a macroporous silicon template, a kind of absorber for visible and NIR is realized. The replicated conic structure itself is of several microns and ineffective in antireflection, but the subsequent deposition of iron on top generates nanometer-size columnar structures, and thus broadband absorption enhancement is achieved. Random plasmonic nanostructures can be obtained in a similar way, with intrinsic electromagnetic hot spots for field enhancement applications.