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Student Paper

Nanosphere Lithography: Fabrication of Periodic Arrays of Nanoholes

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Nanosphere Lithography (NSL) is inexpensive, inherently parallel, high-throughput and general material nanofabrication technique [1] where single layer polystyrene nanosphere (PSNs) were used as template. The template created by PSNs can be manipulated by various complimentary techniques such as binary layers of PSNs [2], reactive ion etching (RIE) [3], electron beam radiation [4] and microwave irradiation [5] to create further extension patterning abilities of the basic NSL technique. The nanostructures obtained from NSL technique are found in wide range of researchers and applications such as in photonic, solar cells, biomedical etc [6 – 8].

In this study, the size of PSNs were shrunk by exposing them to O_2 plasma with various of time (5 – 30 s). The average diameters of the shrinking PSNs under O_2 plasma etching were plotted. The PSNs were found gradually decreases in diameter corresponded to the O_2 plasma exposure and the etching rate is found to be in the range of 9.1716 nm/s. The etched PSNs were later used as template to deposit metal particles such as Pt and Au. After lift-off process, the sample with thin film Pt or Au, were later etch again to form uniform periodic nanoholes as can be shown in Fig. 1. The nanoholes were characterized by Field Emission-Scanning Electron Microscopy (FE-SEM).

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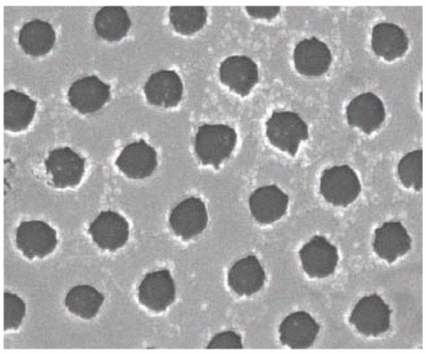

Fig. 1. Pt nanoholes