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**Novel Metallic Surface Arrays for SERS and Surface Forces Experiments** MARGO GRACA, JEFF TURNER, SUNG CHUL BAE, STEVE GRANICK, Departments of Physics, Chemistry, and Materials Science and Engineering, University of Illinois at Urbana-Champaign — Nanofabrication techniques based on FIB (dual-beam focused ion beam lithography) and utilizing a novel solid masking scheme have produced extended arrays of coinage metal nanostructures on muscovite mica and semiconductor wafers. First, the FIB process is used to drill holes in the mask with various alternative shapes, from circles to squares to triangles. Their size is variable from <100nm to many microns, and their spacing and arrangement are also easily varied. These novel structures were used for two emerging applications. First, we demonstrate nanostructured “forest” patterns, arranged perpendicular to the solid, with a high aspect ratio in height to cross-section. Alternatively, these new structures were embedded into hollow spaces within the solid substrate, producing a *physically flat yet chemically rough* surface capable of electronic field enhancement. We demonstrate the ability of these new structures to enhance a Raman (SERS) signal with applications to nano-plasmonics.

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