Enhanced fluorescence emission on a large area gold nanopattern

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Recently, there has been enormous use of metallic nanostructures to favorably modify the spectral properties of fluorophores and to alleviate some of these fluorophore photophysical constrains. The use of fluorophore – metal nanostructures has been termed metal-enhanced fluorescence (MEF). However, most approaches have relied upon the coupling of fluorophores to random distributions of metallic nanoparticles or nanoscale roughness in metallic film. And a few studies have been tried to use nanopattern or nanoparticle cluster fabricated by e-beam lithography which lead precise spatial control but extremely high cost.
For this research, we successfully fabricated high resolution metal nanopatterns by capillary force lithography. Enhancement of fluorescence intensity was tested through coupling with proper fluorophores and surface plasmon in metallic nanostructures with a feature size around ~ 100 nm on a large area of 2.7 mm × 2.7 mm. This approach shows dramatically enhanced emission of nearby fluorescent molecules with controllable spectrum properties by varying the size and the distance of gold nanopatterns.