

# Generation of Enhanced LSPR Field in Periodically Varying Height Metal Nano-pillars

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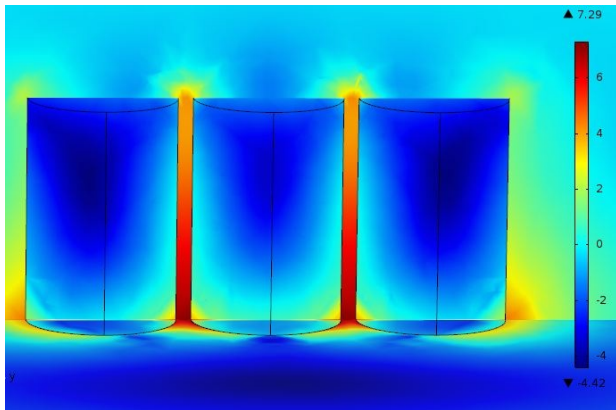
## Abstract

Present work demonstrates a detail simulation results on enhanced generation of localized surface plasmon resonance (LSPR) field condition in a periodically varying height metal nano-pillars. This simulation work has been carried out using COMSOL Multiphysics software. LSPR field condition study in metal nanostructure is important for different fields of applications which include chemical and biological sensors as well as signal enhancer in surface based study mostly in surface-enhanced Raman scattering (SERS)-based sensing investigations. We observed that with periodically varying height in metal nano-pillars, the generated LSPR field conditions are found to be more than that of the uniformly structured metal nano-pillars. For periodically varying height metal nano pillars, the optimum field enhancement obtained was  $1.34 \times 10^9 \text{V/m}$ . Different parameters that govern the LSPR field enhancement in the designed structure has been discussed here. A comparative study between uniform height metal nano pillar and periodically varying height metal nano pillar for sensing the refractive index of the surrounding medium has also been demonstrated here. We envision that our simulation results would be useful for getting the right nano-structured substrate pattern for which it yield enhanced LSPR field condition and thereby can be used for different sensing applications.

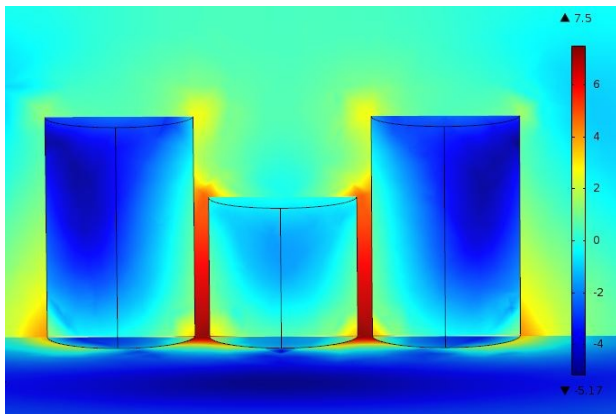
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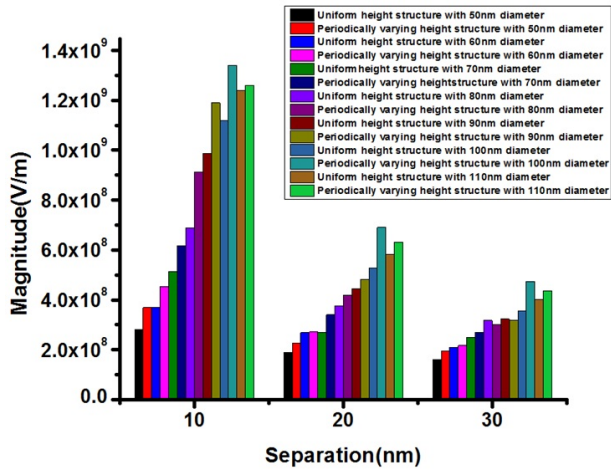
## Figures used in the abstract



**Figure 1:** LSPR field generation in uniform height metal nano-pillar.



**Figure 2:** LSPR field generation in periodically varying height metal nano-pillar.



**Figure 3:** Comparison of LSPR field between uniform height metal nano-pillar and periodically varying height metal nano-pillar.