

CORE-SHELL PLASMONIC NANOGAPPED NANOSTRUCTURED MATERIAL**ABSTRACT**

A core-shell plasmonic nanogapped nanostructured material is provided. The core-shell nanogapped nanostructured material has a core and at least one shell surrounding the core, wherein the at least one shell comprises a first layer comprising a polymer having a catechol group, wherein the first layer defines the nanogap in the core-shell plasmonic nanostructured material, and a second layer comprises a metal disposed on the first layer. A method of preparing the core-shell plasmonic nanogap nanostructured material, and use of the core-shell plasmonic nanogap nanostructured material are also provided. As an embodiment, a polydopamine covalently bonded to a Raman probe or a fluorescent probe is used to prepare the first layer of the shell in said core-shell plasmonic nanogap nanostructured material, thereafter a gold shell is deposited onto the polydopamine to form a second layer of the shell. In present invention, it is demonstrated that the method is highly versatile and can be used for different core materials, including magnetic Fe_3O_4 nanoparticles and metal-organic frameworks (MOF) nanoparticles. The potential application of said core-shell plasmonic nanogapped nanostructured in sensing and theranostics is also demonstrated.

FIG. 1 for publication with abstract