# Label-free Detection of Aromatic Compounds with Plasmonic Nanoantennae functionalized by Graphene Oxides

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Optical detection by using metal nanoparticles has been widely studied due to high sensitivity and selectivity. However, most reports have focused on the detection of biological, hydrophilic molecules due to the well-known surface chemistry while less attention has been paid to the detection of hydrophobic molecules (e.g., benzene derivatives). Here we demonstrate simple, yet innovative, plasmonic nanoantennae functionalized with graphene oxides which allow for label-free detection of aromatic molecules. Gold nanoparticles (GNP) of diameters 20 ~ 80 nm were used and graphene oxides (GO) were attached to the surface of the particles via electrostatic interaction. As-prepared gold nanoparticles functionalized with graphene oxides (GNP/GO) were characterized with dark-field microscopy and TEM. Upon the exposure of GNP/GO to aromatic compounds such as toluene and styrene in ethanolic solutions, significant changes in the resonance position of GNP were observed. This observation is mainly due to pi-pi interaction between graphene oxide and aromatic compounds. Sensitivity and selectivity of our proposed method was also addressed.