Cu@Au self-assembled nanoparticles as SERS-active substrates for (bio)molecular sensing

Cabello, Gema

Nwoko, Kenneth C.

Marco, José F.

Sánchez-Arenillas, María

Méndez-Torres, Ana María

Feldmann, Jorg

Yáñez, Claudia

Smith, Tim A.D.

Cu0(core)-Au0(shell) (Cu@Au) bimetallic nanoparticles (NPs) synthesized under microwave-assisted heating were interrogated for surface enhanced Raman scattering (SERS)-active substrates. NPs characterization, by XRD, XPS and UV/vis spectroscopy, showed the formation of self-assembled particles with the occurrence of electron transfer from Cu to Au and the absence of CuxO. TEM and AF4 demonstrated NPs with a mean diameter of 4.7 nm. Despite the low LSPR shown by small nanoparticles (<10 nm diameter), our Cu@Au NPs showed enhanced SERS effect, demonstrated by the calculated scattering signal enhancement factor (3 × 105), which may be related to electromagnetic coupling. Selected examples of analytes of interest, including some biomolecules, were studied to demonstrate the versatility of our Cu@Au NPs as SERS-active substrates.