ANYL 462: A silver coated gold nanorod decorated fibrous SERS substrate for arsenic detection

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We report the fabrication of a 3D surface enhanced Raman scattering (SERS) substrate composed of silver coated gold nanorods (Ag/AuNRs) supported on polycaprolactone (PCL) electrospun fibers for the detection of arsenic species. The decoration of Ag/AuNRs onto PCL fibers benefits from the universal nature of our fabrication strategy based on electrostatic attraction as the driving force that immobilizes negatively charged Ag/AuNRs onto positively charged PCL fiber surface. By using 4-Mercaptopyridine (4-Mpy) as a probe molecule, the Ag/AuNR- based SERS substrate has been demonstrated to be a highly sensitive and reproducible sensing platform. In addition, compared to a SERS substrate fabricated with AuNRs, those fabricated with Ag/AuNRs with different Ag coating thicknesses were found to exhibit larger SERS enhancement, which could be attributed to electron transfer between the gold core and silver shell in a bimetallic rod-shape nanostructure.
Because of the surface chemistry provided by the silver coating, both organic and inorganic arsenic species could be detected. Four arsenic species were studied, including two organic arsenic compounds as veterinary antimicrobials (p-arsanilic acid and roxarsone) and two inorganic compounds (arsenite and arsenate), which are the most common arsenic species found in water. Quantification studies of these compounds have been carried out on these SERS substrates and a detection limit of 10 ppb was achieved. The effect of salt ions on the SERS spectrum of arsenate and in-situ studies of arsenate absorption and desorption have also been investigated.

Sessions

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