Hybrid pH-Responsive Au@p4VP Microgels as Platform for Selective SERS Analysis

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We present the synthesis a of pH-responsive core@shell hybrid microgel. This colloidal system is formed by a 55 nm Au core individually covered by a polymeric pH-sensitive shell of poly(4-vinylpyridine), that we denote as Au@p4VP. Initially, we control the microgel thickness from 51 to 10 nm, and we confirm the pH-responsive capability of Au@p4VP by DLS measurements, showing a swelling degree, which depends on the pH of the media and the crosslinker density within the polymer network. We also prove the hybrid structure by plotting the UV-vis spectra at different pH values, showing a surface plasmon band displacement in function of pH. Thus, at acidic pH the microgel swells due to the electrostatic repulsion created into the polymer matrix, while at high pH, the microgel structure collapses because of the reduction in the electrostatic repulsion and the increment of the hydrophobic interactions. This capability is exploited to introduce doxorubicin molecules into the microgel network which are detected by surface-enhanced Raman spectroscopy (SERS). After increasing the pH of the solution, the captured molecules are brought in close proximity to the surface of the metallic core, enhancing its detection by SERS.

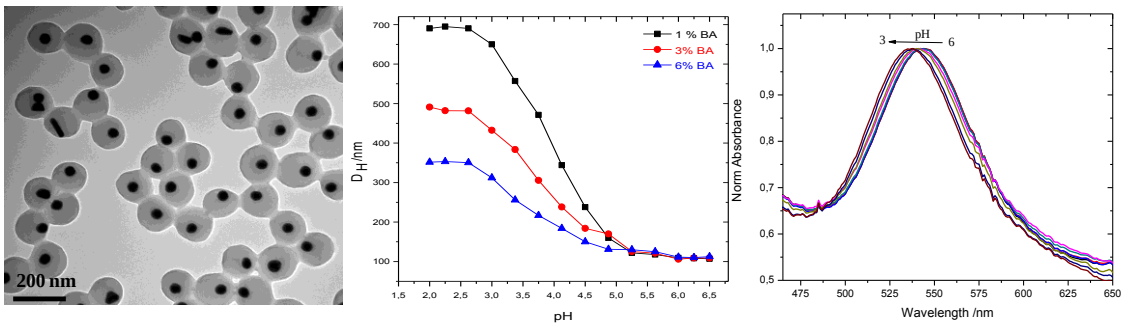

Figure 1. TEM images of the Au@p4VP system (left), DLS measurement at different crosslinking densities (middle), and UV-vis spectra at several pH values (right).

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