





## Multi-branched polymers for enhancing colloidal stability of SERS nanoprobes and evaluating cell trafficking

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**Abstract**: Multi-branched polymers is a class of surfactant used in the drug delivery for their ability to chelate the nanoparticles (NPs) surface. Most of the coatings are obtained through multi-step synthesis and often, using catalysts. Here, a new multi-dentate polymer is presented: easy to synthesize and to coat metal-noble nanoparticles for improving their wide applicability. This is possible by modulating the side molecules chains during the polymer synthesis. The choice of 4-aminothiophenol (4-ATP) to graft poly(isobutylene-alt-maleic anhydride) allowed high surface affinity for gold and silver NPs improving high colloidal stability after removal of excess surfactant without toxicity levels for HeLa cells. 4-ATP is a well-known molecule employed in sensing field showing characteristic SERS signals in the presence of plasmonic nanostructures. Data obtained are referred to NPs diverse in shape and size (spherical and anisotropic NPs) by applying three laser wavelengths (533, 633 and 785 nm). Among the NPs library, cubic concave nanoparticles (CCNPs) revealed high promising potentially for the diagnostic applications in the NIR.

Moreover, polymer coated silver nanocubes (AgNCs@PAP) are chosen to evaluate cell trafficking through SERS microscopy - revealing different Raman spectra as function of pH, values characteristics of the endosomal stages. In this way, it could be possible to understand where the NPs are during cell internalization and if they can promote endosomal escape phenomena using SERS microscopy at 533 nm.