Biocompatible Nanostars for SERS detection

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The use of SERS nanoprobes for the study of biological systems has a wide range of potential applications, such as cancer treatment, drug delivery or early disease diagnosis [1]. Metallic nanostructures of different sizes and morphologies have been used in SERS spectroscopy, both with and without molecular tags depending on the desired application. To this end, it is important to control synthesis parameters to ensure reproducible morphologies and signal enhancement.
In this work we present the synthesis of gold nanostars obtained by reduction with HEPES (4-(2-hydroxyethyl)-1-piperazineethanesulfonic acid) and their application for SERS. Nanostars were synthesized with different reducing agent concentrations (Figure 1), and their enhancing properties evaluated. Coverage of these nanostructures with a non-charged polymer (polyvinylpyrrolidone) increased their agglomeration and changed their signal enhancement. Both as-made and covered nanostars were incubated with mammalian cells to evaluate their potential for SERS biomolecule detection.

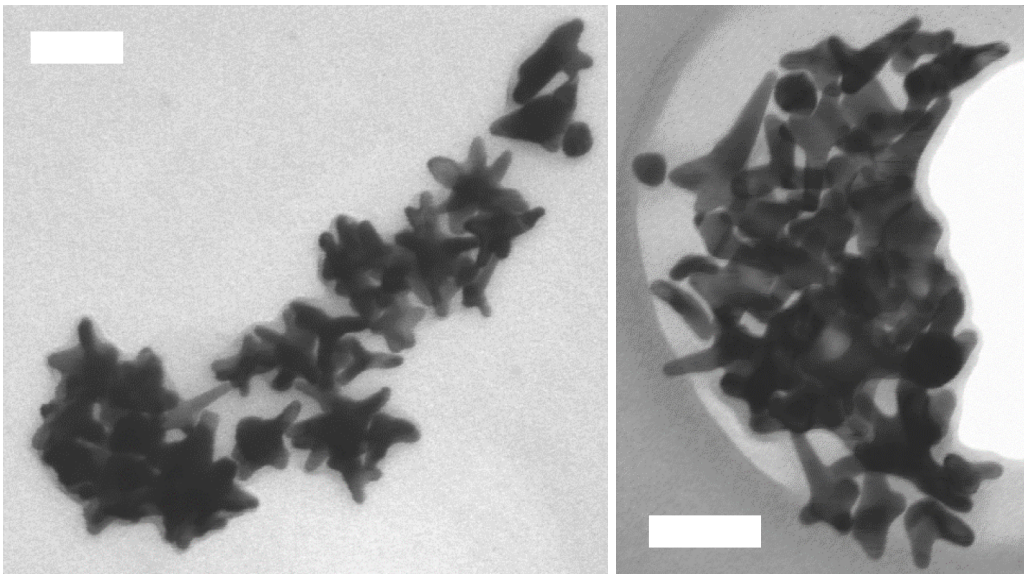

Figure 1: Gold nanostars synthesized with different concentration of HEPES. Left: 75mM HEPES; Right: 100mM HEPES. Scale bar: 50nm.

[1] Kneipp, J., ACS Nano 2017, 11(2), 1136-1141