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Raman Reporters Derived From Aryl Diazonium Salts for SERS Encoded-Nanoparticles

Sensing and imaging technologies based on the use of nanoscale tools have received growing interest these last decades. Among the portfolio of reported bioimaging nanotools, labels based on optically encoded metallic nanoparticles (NPs) are particularly attractive as they are efficient Raman signal enhancers, giving rise to intense surface-enhanced Raman spectroscopy (SERS) signatures. The rising popularity of SERS tags in recent years has made them a compelling alternative to fluorescent probes, thanks to their distinctive advantages. Indeed, unlike the broad spectral profiles associated with fluorescent probes, SERS tags produce multiple sets of narrow peaks, resulting in minimal spectral overlap and exceptional multiplexing capability. In this talk, we will describe the potential of aryl diazonium salt-encoded gold or silver nanoparticles as contrast agents for Raman imaging[1-3]. Compared to the commonly used thiol self-assembled monolayers for SERS tag preparation, aryl diazonium salts offer several key advantages: (i) they form robust interfacial bonds with the supporting NPs, (ii) they generate intense SERS fingerprints, and (iii) they allow for the creation of multifunctional layers. These multilayers have been utilized to incorporate multiple SERS labels along the grafted polyaryl chains and introduce post-functionalization sites. Thanks to this strategy, anticounterfeiting inks could be prepared and deposited using additive printing techniques, such as inkjet printing. This next-generation of SERS-encoded NPs has been investigated for its potential applications as optical nanosensors, anticounterfeiting agents, and contrast agents for SERS bioimaging (see Figure 1).

References

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Figures

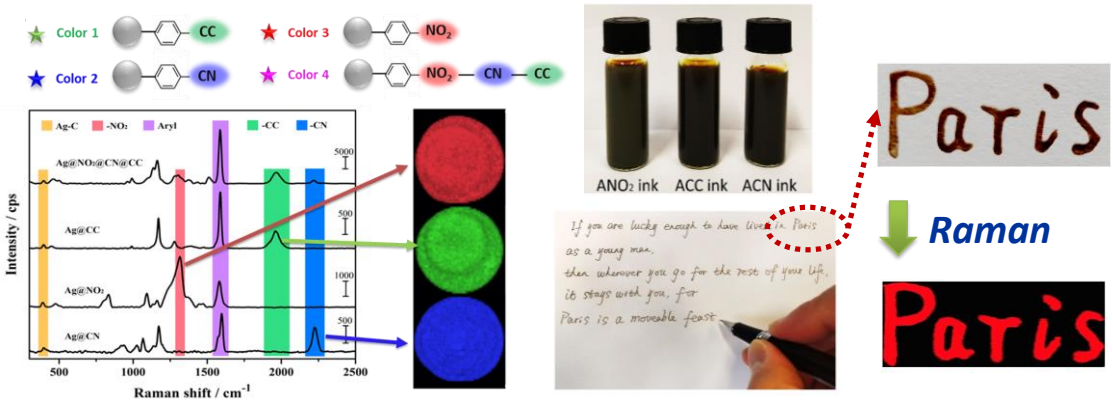

Figure 1: Illustration of SERS-encoded NPs functionalized by diazonium salts along with their SERS spectra and images (left-hand side). Picture of the anti-counterfeting inks and corresponding optical and Raman images (right-hand side).