SERS study of fluorescent and non-fluorescent compounds: What is the role of excitation wavelength on SERS signal?

Marcela Dendisova[a], David Palounek[a], Zuzana Nemeckova[b]

(Department of Physical chemistry[a], Department of Analytical chemistry [b], University of Chemistry and Technology Prague, Technicka 5, 166 28 Prague 6, Czech republic)
marcela.dendisova@vscht.cz

Surface-enhanced Raman scattering (SERS) spectroscopy is a powerful tool which is suitable for investigation of small amounts of substances adsorbed on plasmonic (Au, Ag or Cu) nanostructured substrates[1]. It is known that fluorescence is undesirable accompanying effect to Raman scattering. The fluorescence effect can be reduced using various excitation wavelengths. The enhancement mechanisms in SERS spectroscopy depend on several factors, as e.g. applied potential[2], temperature or applied excitation wavelength[3]. The substrates used in the study were prepared using electrochemical gold coating of platinum target in two-electrode arrangement using special current sequences. SERS signals of fluorescent (chrysin and quercetin) and non-fluorescent (16-mercaptohexadecanoic acid) compounds adsorbed on the prepared Au large-scaled nanostructured substrates were studied using Raman spectroscopy at various excitation wavelength (532, 633, 785 and 1064 nm). It was observed that applied excitation wavelength affects mainly electromagnetic mechanism of surface enhancement for the both types of fluorescent (Figure 1) and non-flourescent compounds and charge transfer mechanism of fluorescent compounds, primarily CO and C=C bonds.

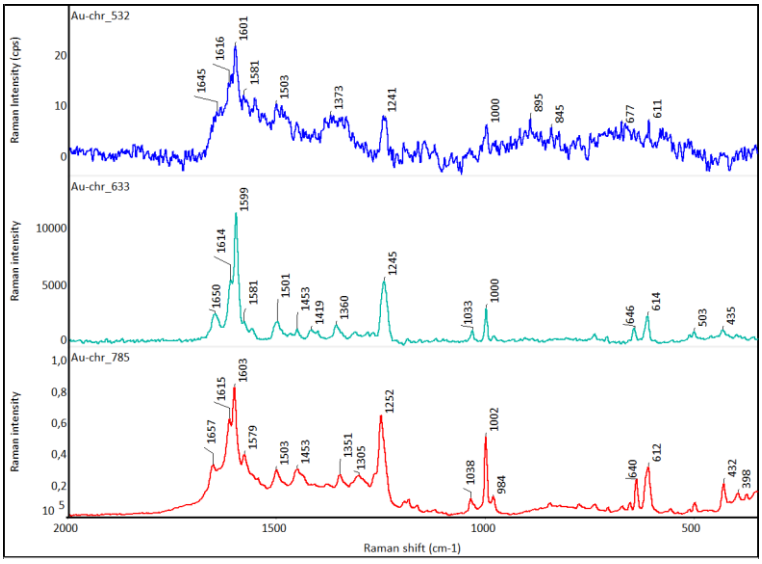

Figure 1 SERS spectra of chrysin adsorbed on Au at 532, 633, 785nm excitation wavelengths

1. M. Dendisova-Vyskovska, et al., *J. Mol. Struct.*, 2013, **1038**, 19-28.
2. M. Dendisova-Vyskovska, et al., *Spectrochim. Acta A*, 2012, **99**, 196-204.
3. T. V. Shishkanova, et al., *Electrochim. Acta*, 2017, **224**, 439-445.