Application of Silver Nanoplates for SERS

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We have successfully developed the manufacturing process for the aqueous dispersions of silver nanoplates (AgPL) on a maximum scale of 50 liters. Simultaneously, the size of AgPL is well-controlled, which obtain the colorful aqueous dispersions arising from the localized surface plasmon resonance (LSPR) of corresponding-sized AgPL as shown in Fig. 1. Please refer to our website in detail [1]. The simple method to fix AgPL on the glass is also investigated. Using the undercoating of modified clay, we found that their LSPR were substantially maintained. Fig. 2 shows that two different sizes of AgPL are fixed in two spots on the small glass substrates. The surface enhanced Raman scattering (SERS) of 4, 4'-bipyridine was significantly observed in these AgPL fixed areas. It is our advantage that the LSPR of AgPL is adjusted to the wavelength of Raman excitation laser. We will additionally report another application of the aqueous dispersions of AgPL, which is the premixing method of AgPL with target compounds, for SERS.

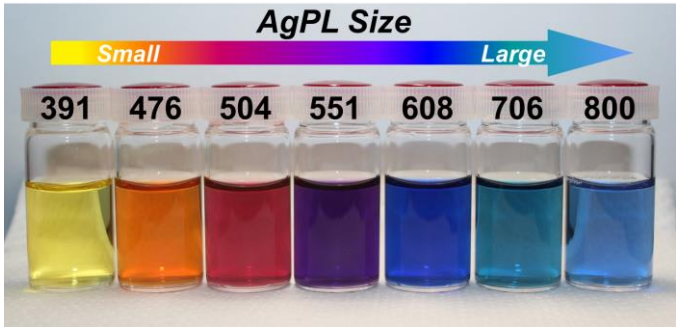

Fig. 1: The aqueous dispersion for different-sized AgPL. The peak wavelengths of LSPR in their UV/Vis/NIR extinction spectra are shown in nanometer.

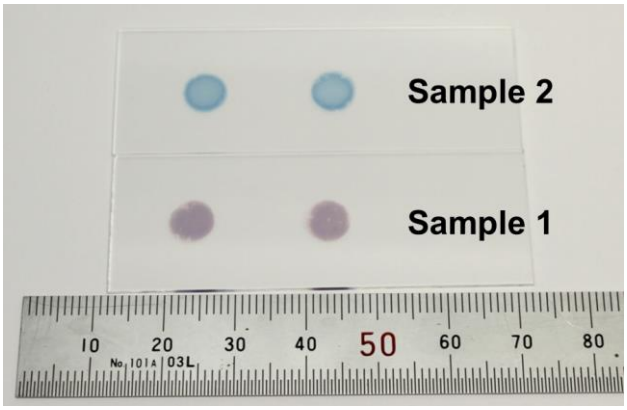

Fig. 2: The AgPL fixed glass sheets. Sample 1 and 2 are used AgPL of which the peak wavelength of LSPR in the aqueous dispersion are 519 nm and 804 nm, respectively.

[1] http://www.ito-laboratory.or.jp/