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Electromagnetic Enhancement Factor of Surface-enhanced Raman Scattering of Rh6G Molecules on Au Nanoparticles JAETAE SEO, Department of Physics, Hampton University, Hampton, Virginia 23668, U.S.A., WANJOONG KIM, Electronics and Telecommunications Research Institute, Daejeon 305-700, South Korea, SUNGSOO JUNG, Korea Research Institute of Standards and Science, Daejeon 305-340, South Korea — Surface-enhanced Raman spectroscopy (SERS) of molecules on nanometals has been intensively studied for technical application of bio-chemical sensing. Among physical origins of SERS enhancement, the electromagnetic effect is the most fundamental contribution of SERS enhancement. Relevant REF of C-C stretching mode of Rh6G near 1511 cm^{-1} was shown two-order enhancement with 5-nm Au colloidal nanoparticles. The REF was greatly enhanced up to \sim six orders with \sim 35 nm Au particles, and was enhanced \sim five orders with 40-nm Au nanoparticles. The reduction of REF with smaller sizes is possibly due to the scattering of conduction electrons on particles surfaces; that with larger sizes is probably due to tips or complex structures. This work at Hampton University was supported by the National Science Foundation (HRD-0734635, HRD-0630372, and ESI-0426328/002) and the U.S. Army Research Office (W911NF-07-1-0608).

JaeTae Seo
Hampton University

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