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High Sensitivity Detection of Neurotransmitters CHAO QIU, Department of Physics, University of Texas at El Paso, El Paso, TX, KEVIN BENNET, Division of Engineering, Mayo Clinic, Rochester, MN, KENDALL LEE, Department of Neurologic Surgery, Mayo Clinic, Rochester, MN, JONATHAN TOMSHINE, MALCOLM MCINTOSH, SETH HARA, Division of Engineering, Mayo Clinic, Rochester, MN, JOHN CIUBUC, Department of Physics, University of Texas at El Paso, El Paso, TX, FELICIA MANCIU, Department of Physics, Border Biomedical Research Center, University of Texas at El Paso, El Paso, TX, MAYO CLINIC, ROCHESTER, MN TEAM, UNIVERSITY OF TEXAS AT EL PASO, EL PASO, TX TEAM — Detection of trace amounts of neurotransmitters has become significant in diagnostic applications. A powerful analytical tool, surface-enhanced Raman spectroscopy (SERS) has been used to detect numerous analytes. In this study, silver nanoparticles (Ag NPs) were utilized as SERS-active substrates for high sensitivity detection of dopamine, serotonin, and adenosine in concentrations as low as nanomolar. At high resolution, real-time Raman spectra were recorded in about 200 ms. At the molecular level, neurotransmitters can be present in the proximity of metallic nanoparticles in different orientations or even adsorbed on them; inhomogeneous Raman enhancement was thus observed, with SERS vibrational lines varying in their intensities depending on the dominant orientation. These variations might also be related to the intrinsic Raman cross section of the molecules and their concentration in the vicinity of Ag NPs. Thus, this SERS study also addresses adsorption dynamics, besides advancing knowledge of high sensitivity detection.

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