14th World Summit on
Alzheimer's Disease, Dementia Care Research and Awareness
&
6th World Summit on Heart, Stroke and Neurological Disorders
August 31- September 01, 2018 | Boston, USA

Sang-Wha Lee

Gachon University, South Korea

Core-shell plasmonic manostructure as a reliable SERS-active substrate for an ultrasensitive detection of plasma dopamine levels in patients with drug-induced Parkinsonism

The purpose of this work is to quantify plasma dopamine levels using SERS in patients with antipsychotic-induced Parkinsonism and healthy control subjects in order to evaluate the utility of optimized SERS techniques. Both patients and control blood samples were collected in tubes containing EDTA and centrifuged at 3000 rpm for 5.5 min. Plasma supernatants were collected and stored at −70 °C until assayed. Silver-coated Au NPs on the ITO glass (so-called Au@Ag_ITO) were employed as SERS-active substrates for the sensitive detection of dopamine from the blood samples which underwent dopamine extraction process. In this work, we optimized the fabrication of core-shell nanostructures consisting of gold half-core and silver half-shell, showing the best performance in SERS measurements. Au nanoparticles (NPs) were first electrodeposited on the indium tin oxide (ITO) glass and the deposited Au NPs were subsequently coated with thin silver layer in order to sensitively detect dopamine in human blood plasma. The plasmonic effect of metallic nanostructures were optimized by adjusting metal precursors, deposition potentials and growth times through the variation of particle density, particle size, nano-gaps and surface morphology. The optimized SERS substrates confirmed the dopamine concentration in the blood samples, which were ranged in ~10^{-8} -10^{-9} M. The mean dopamine concentrations of the patient and control groups were 3.24 x 10^{-9} M and 2.31 x 10^{-8} M, respectively, indicating that patients with antipsychotic-induced Parkinsonism have substantially lower dopamine concentration by approximately 70% compared to the mean dopamine concentration of healthy subjects. These results suggest that the optimized SERS techniques may have clinical utility in differentiating between patients with parkinsonism and healthy subjects.

Biography

Sang-Wha Lee has completed his PhD in 1995 from Ohio State University (USA) and worked as a research scholar from the University of Houston in 2003. He has published more than 20 papers related to SERS area and served as an editorial board member in the Korean Society of Industrial and Engineering Chemistry.

Seong.an@gmail.com

Notes: