



Contribution ID: 53

Type: Oral

## Ag-Au bimetallic nanoparticles deposited on filter paper as a simple SERS substrate for the quantitative analysis of Carbofuran and 2,4-dinitrophenol

*Saturday 1 November 2025 15:45 (15 minutes)*

Ag-Au bimetallic nanoparticles deposited on filter paper as a simple SERS substrate for the quantitative analysis of Carbofuran and 2,4-dinitrophenol

Primary author: Nituraj Changmai<sup>1</sup>,

Co-author: Dipjyoti Sarma<sup>2</sup>, Pabitra Nath<sup>1\*</sup>

Presenter: Nituraj Changmai

<sup>1</sup>Department of Physics, Tezpur University

<sup>2</sup>Faculty of Science, Assam down town University

\*Corresponding author: pnath07@gmail.com

Surface-enhanced Raman scattering (SERS) has emerged as a reliable molecular spectroscopic technique for its high sensitivity and label-free detection capabilities [1], [2], [3]. Herein, we report Ag-Au bimetallic nanoparticles deposited on Whatman filter paper as a simple, highly effective, and flexible SERS substrate. The proposed SERS substrate has been developed through drop-casting silver and gold nanoparticles onto the Whatman filter paper. Prior to the experimental investigation, the Au-Ag bimetallic nanoparticles on the filter paper have been characterized by field emission scanning electron microscopy (FESEM), energy-dispersive X-ray (EDX), and X-ray diffraction (XRD). The initial performance of the substrate has been evaluated using two Raman-active dyes –namely, malachite green (MG) and rhodamine 6G(R6G) is reported. Upon noticing their reliable performance with the standard Raman active samples, the applicability of the substrate has been realized through the detection of Raman signals from two pesticides, namely, 2,4-dinitrophenol and Carbofuran in wastewater samples. During the presentation, details of the findings will be presented during the conference.

References:

[1] X. Tian et al., “New Trends in SERS Substrates With Micro-and Nanostructures: Materials, Substrates, Preparation, and Applications,” *Battery Energy*, p. 70023, 2025.

[2] N. Chamuah, A. Hazarika, D. Hatiboruah, and P. Nath, “SERS on paper: an extremely low cost technique to measure Raman signal,” *Journal of Physics D: Applied Physics*, vol. 50, no. 48, Art. no. 48, 2017.

[3] D. Sarma, S. Biswas, D. Hatiboruah, N. Chamuah, and P. Nath, “100 GSM paper as an SERS substrate for trace detection of pharmaceutical drugs in an aqueous medium,” *Journal of Physics D: Applied Physics*, vol. 55, no. 38, Art. no. 38, 2022.

**Author:** CHANGMAI, Nituraj (Tezpur University)

**Presenter:** CHANGMAI, Nituraj (Tezpur University)

**Session Classification:** Oral Presentations

**Track Classification:** Track 03: Material Science & Nano-science, Quantum Thermodynamics & Statistical Physics