

Introduction

Raman Spectroscopy

- A nondestructive, fast, selective, & sensitive technique
- Provides information by detecting the vibrational signatures of molecules

Barriers

- Small Raman scattering cross-section (**1 Photon in 10⁷ Photons is Raman active**)
- Highly concentrated samples required

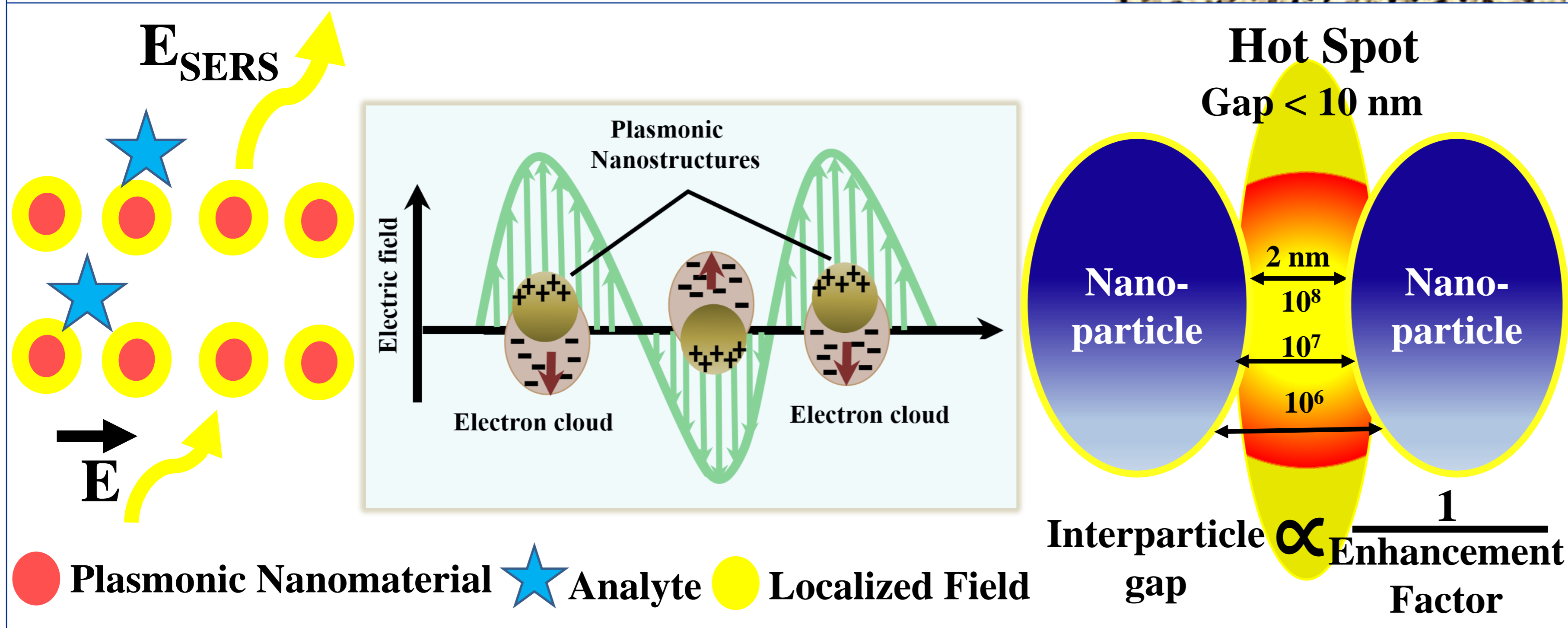
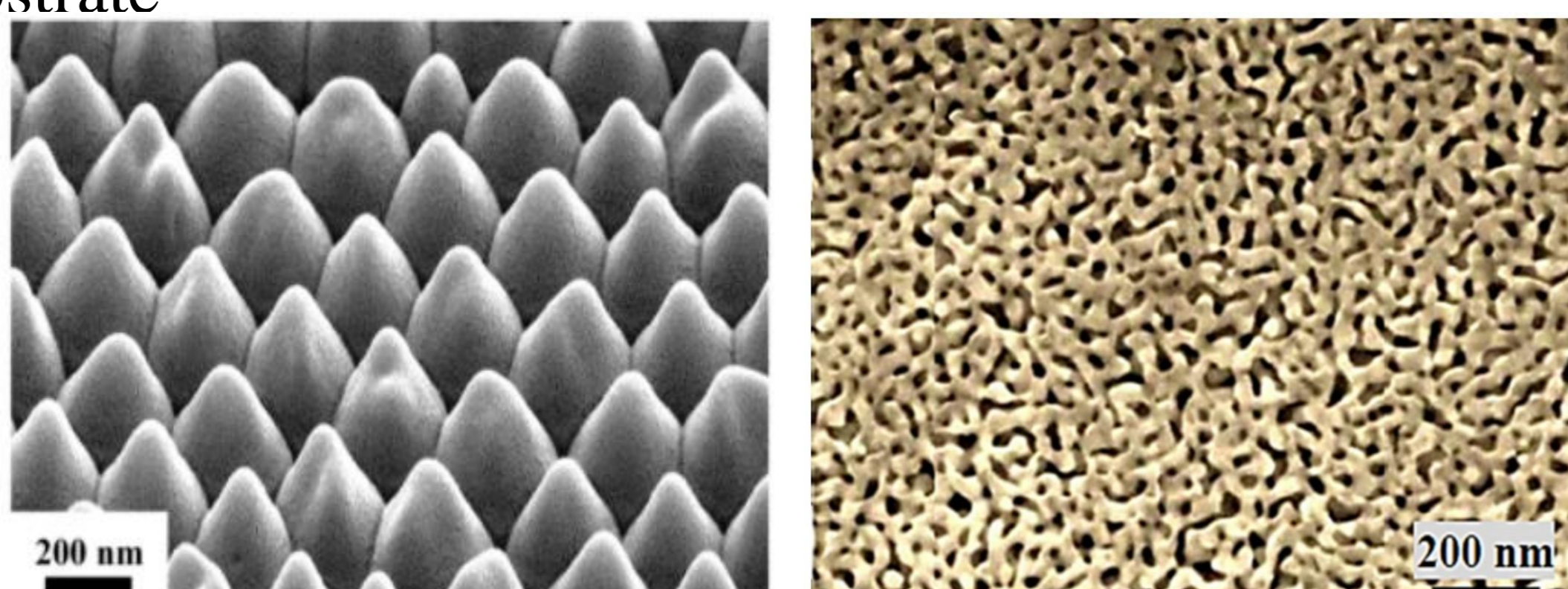
Overcome

Surface Enhanced Raman Spectroscopy (SERS)

Required: Structured plasmonic substrate (Ordered/ Random) [1]

Advantages

- Enhanced signal strength
- Easy sample preparation
- Trace level detection of molecules



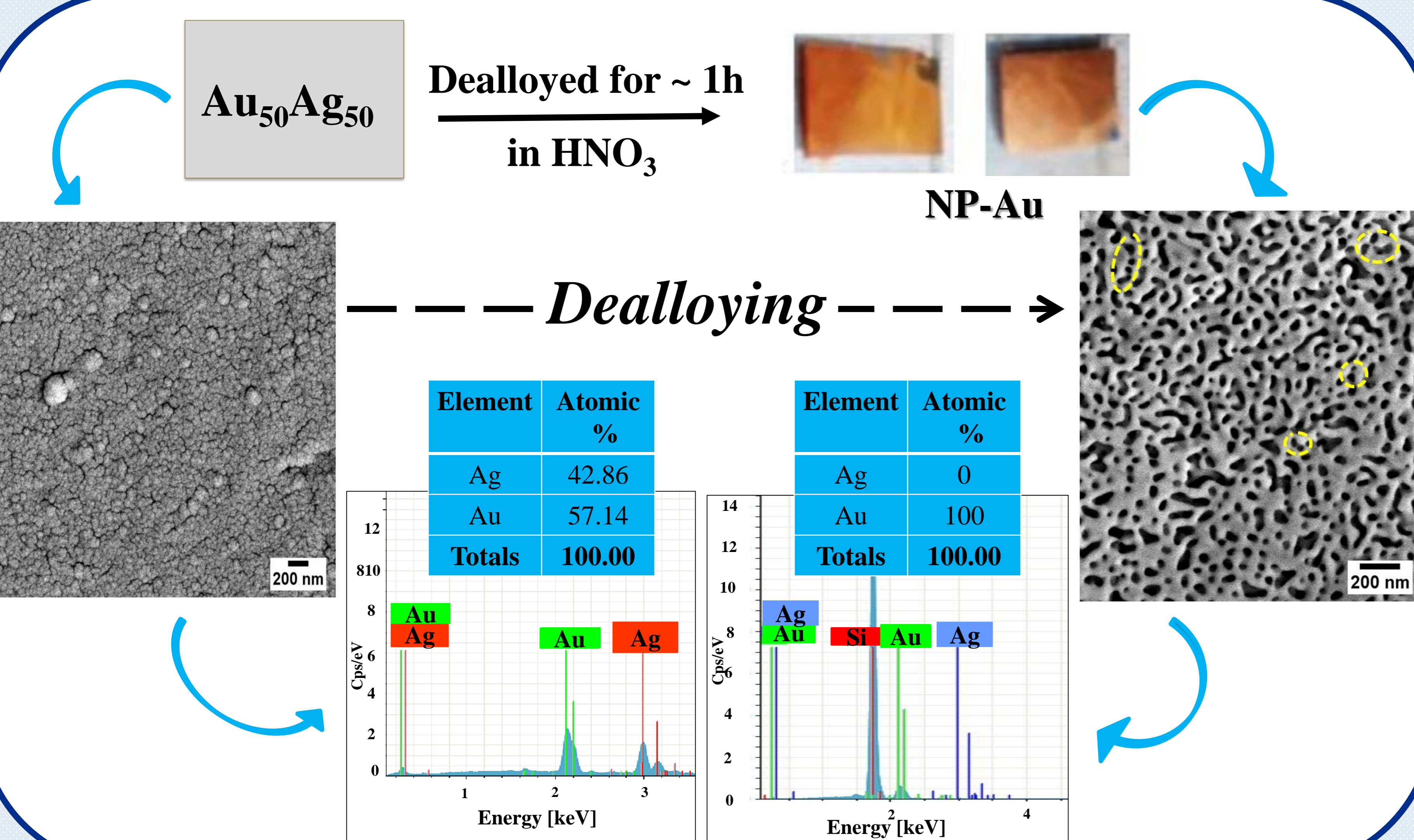
Challenge's in SERS

- Fabrication {facile & reproducible method}
- Uniform & Reusable substrate
- Able to enhance the signal
- Chemically Stable & Cost Effective

Objective

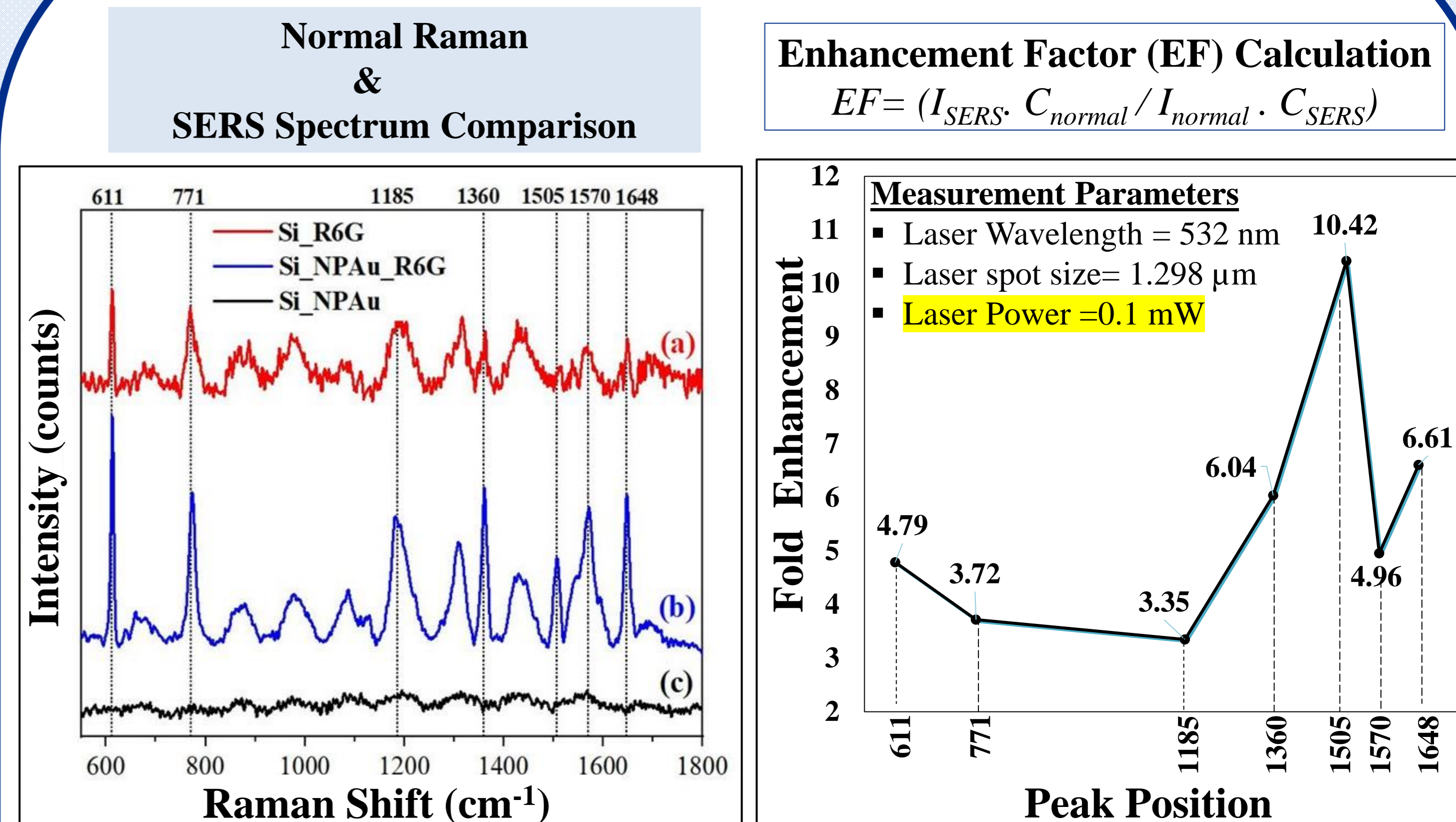
- ✓ Find out facile and cost-effective fabrication method
- ✓ Test substrate effectiveness by detecting Raman modes of R6G
- ✓ Examine the uniformity and reusability of the substrate
- ✓ Determine the enhancement factor of substrate

Fabrication of SERS substrate



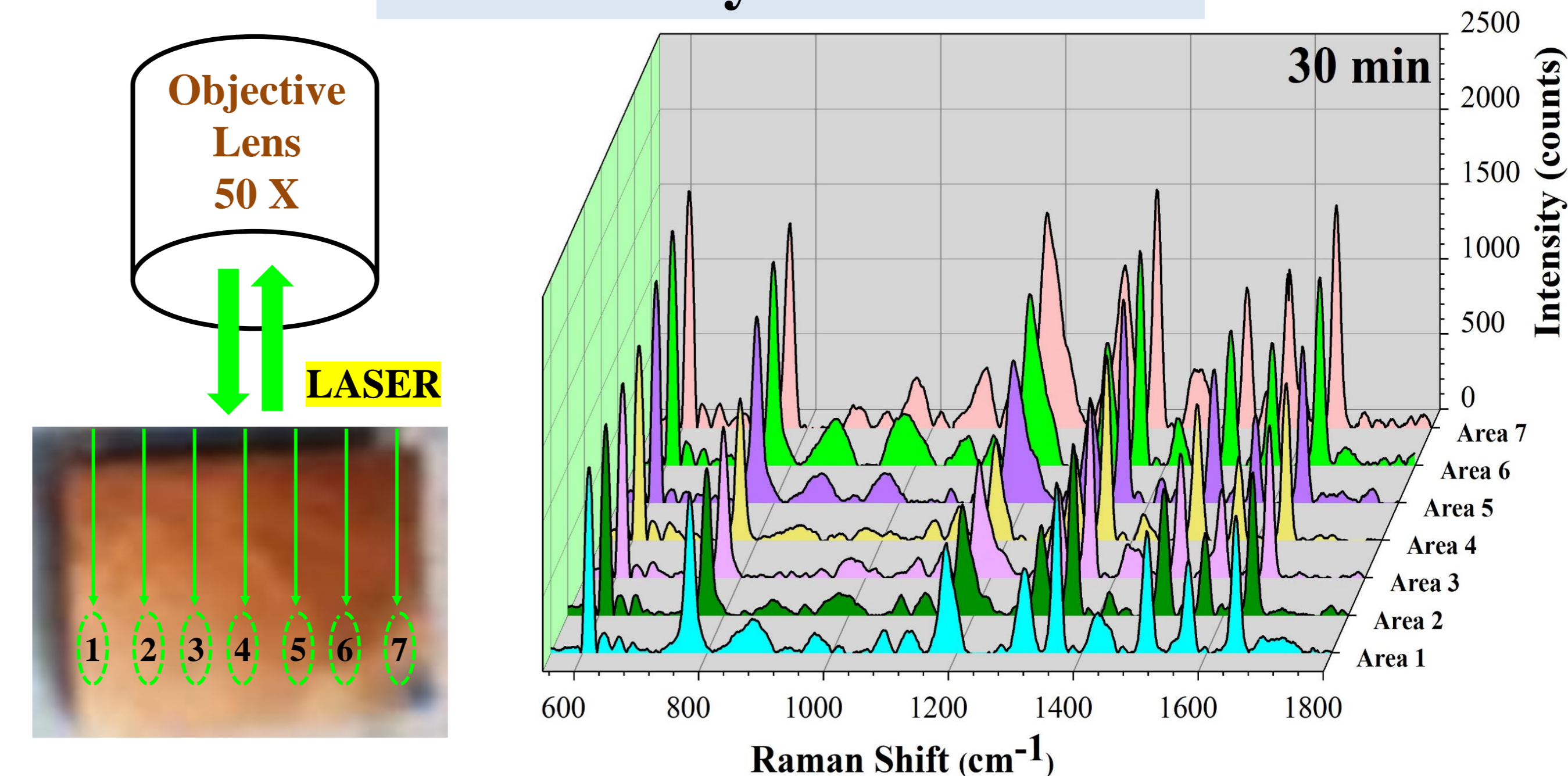
Result & Discussion

SERS Effectiveness of NP-Au

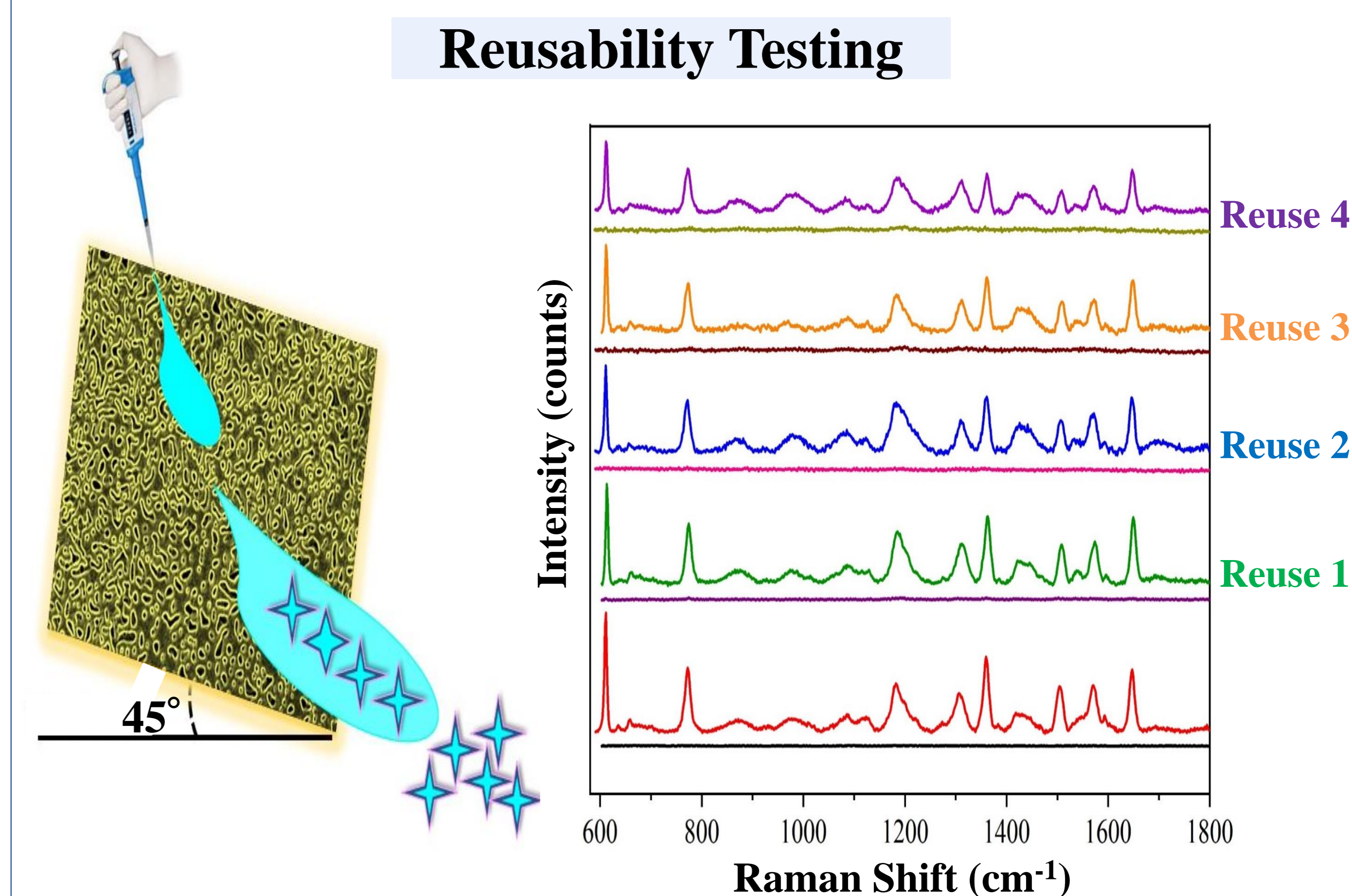


I_{SERS} and I_{normal} = Raman intensities of R6G on Si and NP-Au
 C_{normal} and C_{SERS} = Molar concentration of R6G on Si and NP-Au

Uniformity Examination



Reusability Testing



Variation in Relative Standard Deviation value is less than 20 % in both tests (Uniformity/Reusability)

Conclusions

- A facile, uniform, and reusable SERS (NP-Au) substrate has been fabricated
- Characteristic peaks of R6G molecules are very sharp, intense, and clearly visible
- Ten-fold enhancement has been achieved without modifications onto the substrate morphology
- The substrate is able to show similar intensity SERS signals even after four ethanol washes

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