

Wigner 121 Scientific Symposium

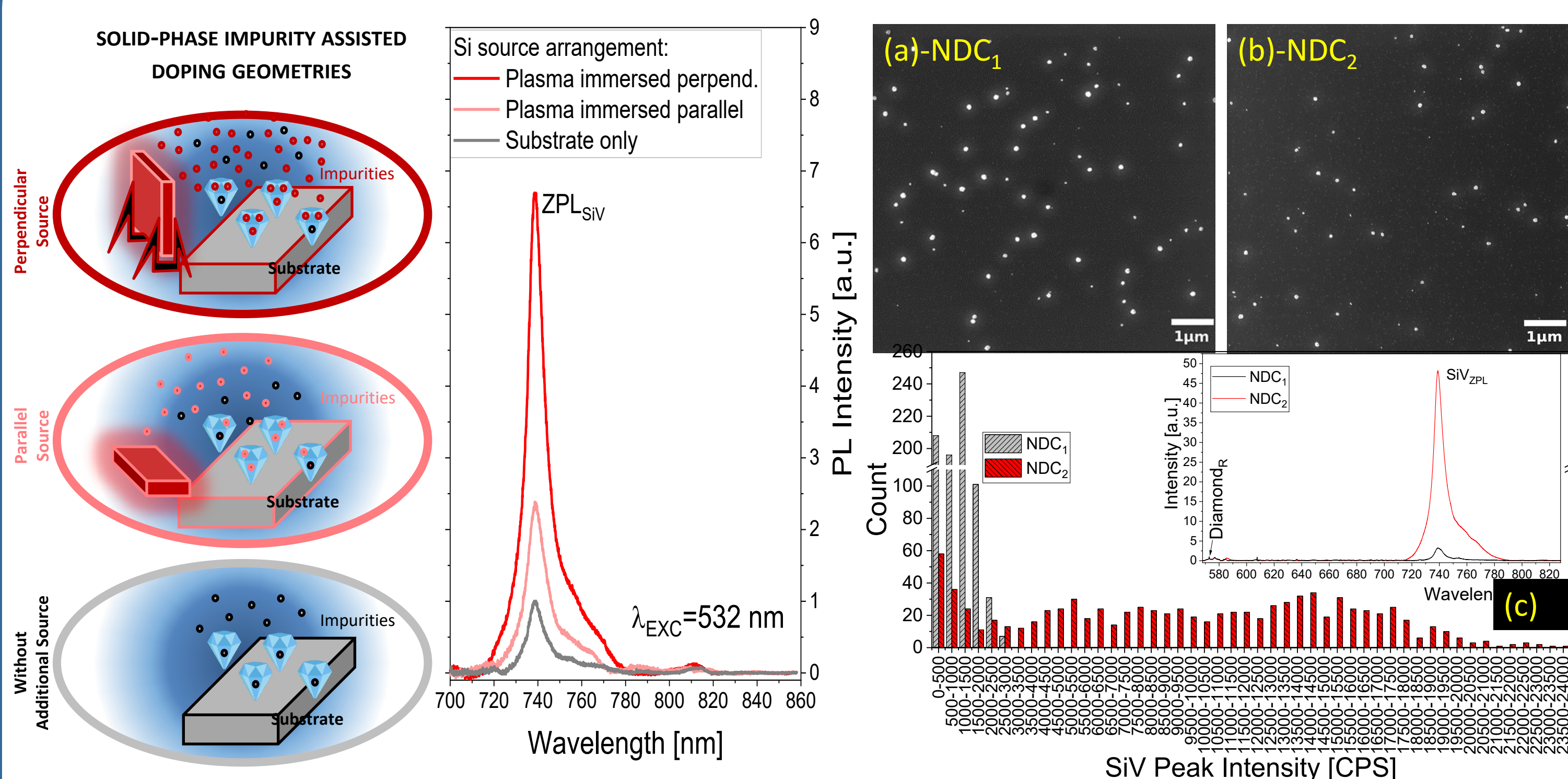
Wigner Research Centre for Physics
Institute for Solid State Physics and Optics
Department of Applied and Non-Linear Optics
*Nanostructures and Applied Spectroscopy
Research Group*

Introduction

Main research areas of the Group:

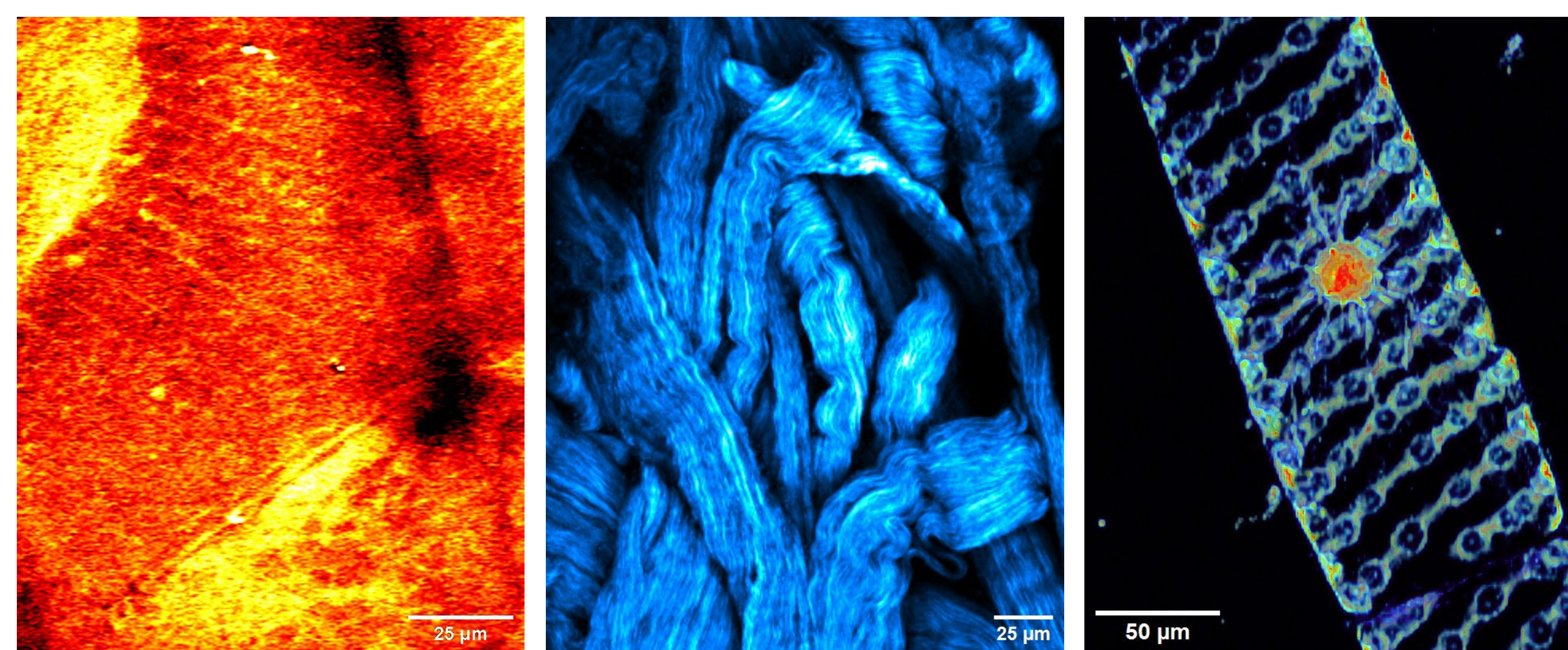
- Preparation and characterization of nanocrystalline diamond films and particles incorporating colour centres
- Gold nanoparticle assisted synthesis of new nanomaterials
- Raman spectroscopic studies on carbon-based nanomaterials, solids, liquids, biological and medical samples
- Fabrication and characterization of substrates for surface-enhanced Raman spectroscopy
- Stimulated Raman spectroscopy and imaging on biological samples

Nanodiamond research



- A simple and easy to realize doping geometry was developed to remarkably improve the colour centre formation efficiency in nanodiamonds.
- Negatively charged silicon-vacancy (SiV⁻) centers were fabricated with 7–10 times higher fluorescent emission intensity.
- The number of silicon impurities incorporated into the diamond nanocrystals was increased because of the beneficial conditions for the atomization of the vertically aligned impurity source.

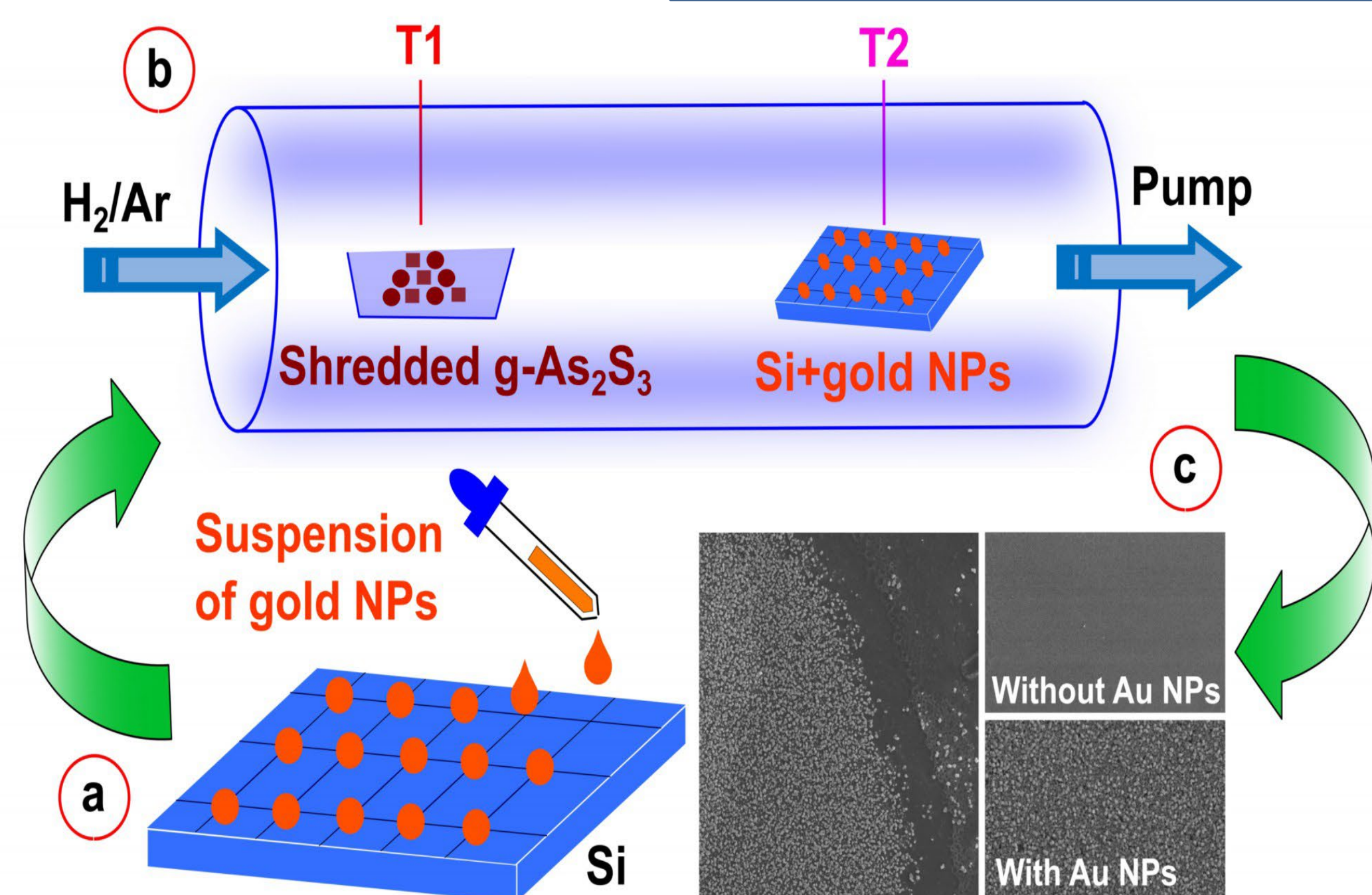
Stimulated Raman scattering



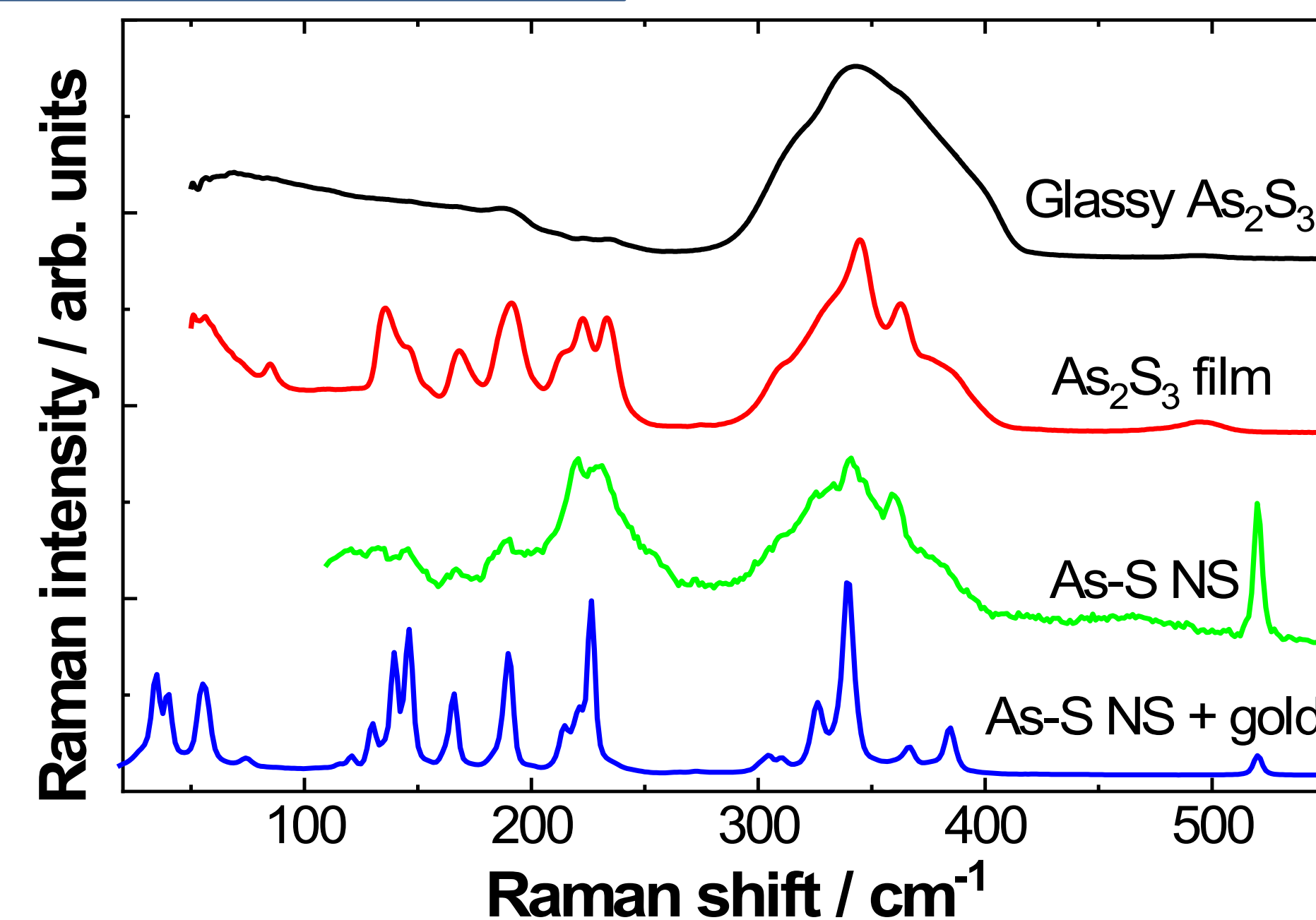
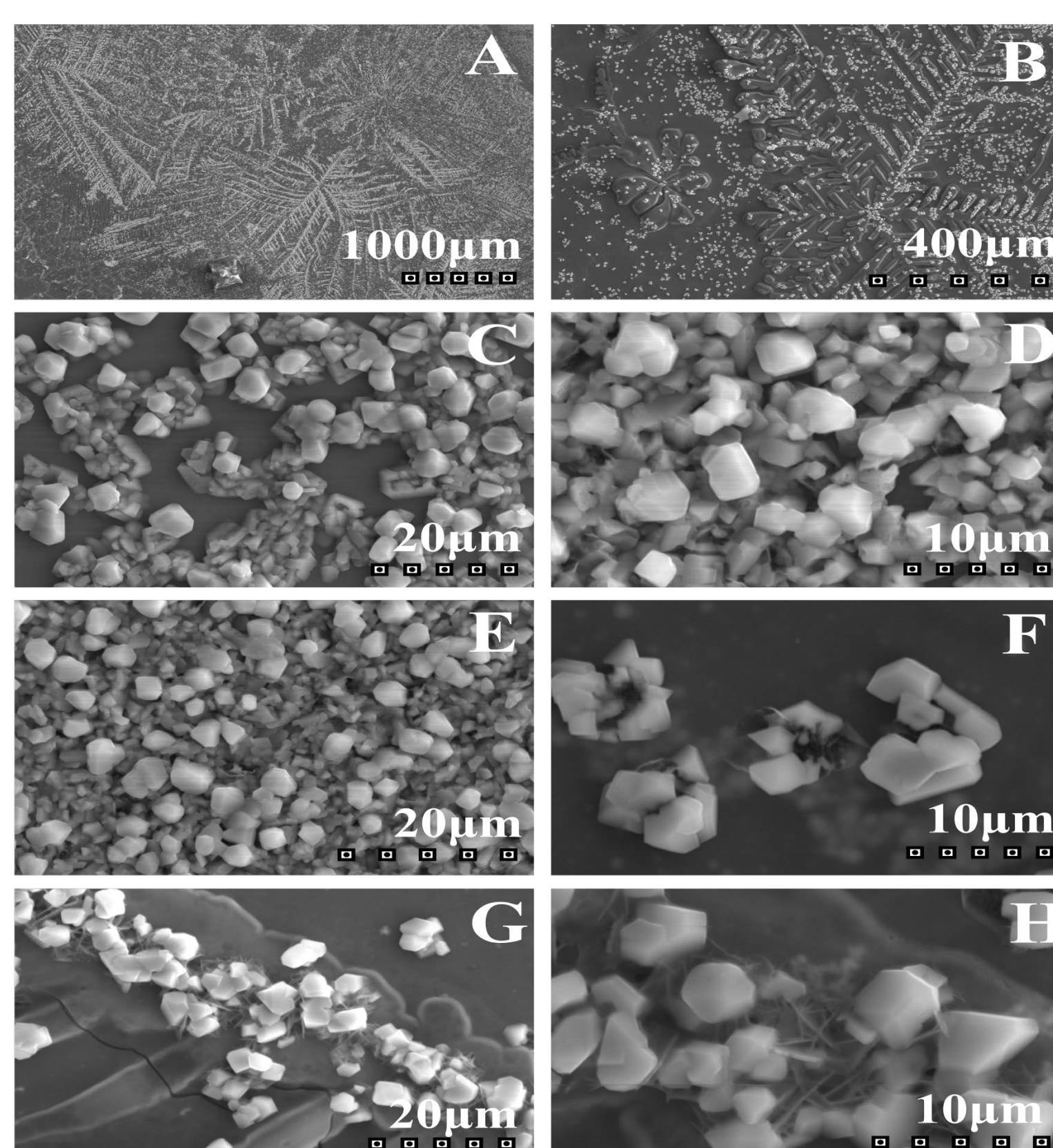
The nonlinear microscope imaging facility allows recording signals from several interactions (SRS: stimulated Raman scattering, TPEF: two-photon excited fluorescence, SHG: second harmonic generation etc.).

- Left: SRS image of in-vivo zebrafish brain (optic tectum, 7 days post-fertilization, 2888 cm^{-1} Raman shift).
- Middle: image of the collagen in porcine dura matter using second harmonic generation (SHG).
- Right: 3D reconstruction from an optical stack of SRS images of a Spirogyra sp. cell structure (nucleus, chloroplast, pyrenoids; 2920 cm^{-1}). The top section was removed for clarity.

Gold nanoparticle assisted nanocrystal growth



Preparation method for gold nanoparticle assisted growth of As-S nanostructures.



Typical SEM images and Raman spectra of the synthesized glassy and crystalline As-S nanostructures.

