An Invasive way of sensing for size detection of nanoparticles

D. Paul[1] and R. Biswas[2*]

[1, 2]Applied Optics and Photonics Research Laboratory, Tezpur University, Dept. of Physics, Tezpur University-784028, Assam, India

[*]corresponding author. rajib@tezu.ernet.in

ABSTRACT

This paper presents a novel platform for sensing different sizes of noble metal nanoparticles. Exploiting evanescent field based excitation of localized surface plasmon resonance (LSPR), gold and silver nanoparticles are immobilized on to surface of U- shaped silica optical fiber (SOF) with a bending diameter of 0.5 cm. We contemplate variation in LSPR responses with respect to altering sizes ranging from ~ 5 to 60 nm of nanoparticles in this all fiber optic set-up. Further, examining coefficient of excitation of different sized nanoparticle yielded by simulation shows good matching with experimental results. While gold nanoparticle immobilized LSPR response provides better sensitivity, the responses achieved from silver nanoparticle are much more stabilized. The successful proof-of-concept fabrication of LSPR enhanced silica fiber is the first step of its kind in generating facile size measurement.

Keywords: Noble metalnanoparticle, photo-detector, optical fiber, localized surface plasmon resonance (LSPR)