# Abstract

**Abstract Title:** Low cost U-bent optical fiber volatile liquid sensor based on localized surface plasmon resonance (LSPR) technique

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**Abstract:**
A fiber-optic volatile liquid sensor has been introduced utilizing localized surface plasmon resonance (LSPR) technique. The unclad portion of a U-bent multimode fiber has been modified through deposition of colloidal nanoparticle layer on to the exposed portion which has been used as the sensing probe. Interaction of noble metal nanoparticles (Ag and Au) and evanescent wave field at the sensing region lead to excite the localized surface plasmons (LSPs) that affect the resonance condition and thereby helps to detect the changes. The vapors of the proposed VLs (viz. acetone, methanol, ethanol and propanol) interacts with the electric field of the plasmons at different concentration of VLs causing a progressive change in resonance conditions of the localized plasmons which eventually modulate the output light signal of the fiber. The modulated light signal falls on a photo-detector at the output end of the fiber and consequently registers the change in voltage response. Using both Ag and Au nanoparticle coating on the unclad portion of the fiber the consistency of the designed optical sensor has been investigated. The response sensitivity for silver NPs coated probe is found to be more uniform than that of gold NPs coated probe. In addition to that, as a proof of concept the sensitivity, working domain, limit of detection (LOD) as well as repeatability test has been evaluated for each set of VLs. The novelty of the proposed sensor lies in its inexpensive and simple optics design, miniaturized optical set-up and quick response towards the analyte concentration.

Keywords—*Localized surface plasmon resonance (LSPR), AgNP (silver nanoparticle), AuNP (gold nanoparticle), VLs (volatile liquids)*

**Professional Biography:**

Dr. Dimpi Paul received her M.Sc. degree in physics from the Tezpur University, in 2012. She is currently working in “Applied optics and photonics research Laboratory” under the supervision of Dr. R. Biswas and Prof. N. S. Bhattacharyya. She has published 6 papers in peer reviewed journal along with 2 book chapters and one proceedings. Her current research

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