

Recent Developments of nano-plasmonic sensors for hydrogen detection

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ABSTRACT

This study describes a metal insulator metal (MIM) structures for hydrogen leak detection. Our nano sensor is based on a transducer layer deposited on the core of a multimode fiber optic. The reference transducer layer is a multilayer stack based on a gold, a silica and a palladium layer.

The multilayer thickness defines the sensor performances in terms of sensitivity, SNR and time response. The silica thickness tunes the resonant wavelength, the gold supports the plasmon and the palladium detects the hydrogen gas in the environment. Experiments and simulations results show: a surface plasmon resonance pic, a shift towards high wavelengths upon hydrogenation and a TM polarized light dependence in a way that the Transverse Electric polarized light can be used as a reference signal. The sensor's characterization obtained for an optimum sensor design lead us to news very promising nanostructured configurations with competitive performances.

Keywords: Nano sensor, hydrogen, detection, plasmonic