Nanophotonic device building blocks, such as optical nano/microcavities and plasmic nanostructures, lie at the forefront of sensing and spectrometry of trace biological and chemical substances. A new class of nanophotonic architecture has emerged by combining optically resonant metal nanostructrues to enable detection at the nanostructure to enable detection at the nanoscale with extraordinary sensitivity.

Initial demonstrations include single-molecule detection and even single-ion sensing. The coupled photonic-plas- monic resonator system promises a leap forward in the nanoscale analysis of physical, chemical, and biological entities. These optoplasmonic sensor structures could be the centrepiece of miniaturised analytical laboratories, on a chip, with detection capabilities that are beyond the cur- rent state of the art. In this paper, we review this burgeon- ing field of optoplasmonic biosensors. We first focus on the state of the art in nanoplasmonic sensor structures, high quality factor optical microcavities, and photonic crystals separately before proceeding to an outline of the most recent advances in hybrid sensor systems