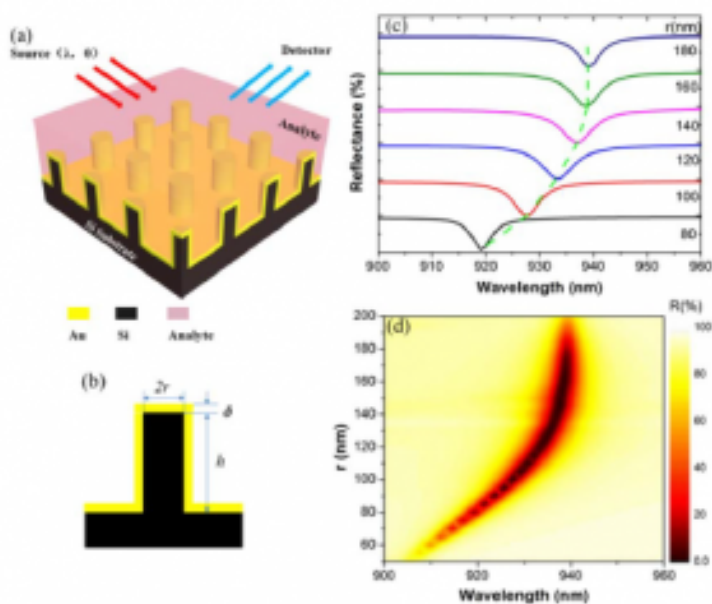


# Silicon-gold core-shell nanowire array for an optically and electrically characterized refractive index sensor based on plasmonic resonance and Schottky junction



This work reports the plasmonically enhanced refractive index sensor consisting of silicon nanowire array (Si-NWA) coated by a conformal gold (Au) nanoshell. Compared to the pure Si or Au NWA system, the Si-Au core-shell setup leads to substantially enhanced optical in-coupling to excite strong surface plasmon resonance (SPR) for highly sensitive sensors. Results indicate that the SPR wavelength can be subtly tuned by manipulating the nanowire radius, and it shows a strong shift with very small variation of the refractive index of the analyte. Furthermore, they configure the system into the Schottky

junction, which can separate the photogenerated hot electrons so that the electrical outputs under various incident wavelengths can be measured. The capabilities of optical and electrical measurements ensure a high flexibility of the sensing system. Through their optoelectronic evaluation, the optimally designed system shows a sensitivity up to 1008 nm per refractive index unit and a full width at half-maximum of 9.89 nm; moreover, the high sensing performance can be sustained in a relatively large range of the incident angle.

**Source:** <https://www-osapublishing-org.ezp3.semantak.com/ol/viewmedia.cfm?URI=ol-42-7-1225&seq=0&origin=search>

**Related paper:** Qin, L et al., Silicon-gold core-shell nanowire array for an optically and electrically characterized refractive index sensor based on plasmonic resonance and Schottky junction, *Optics Letters*, Vol. 42, Issue 7, pp. 1225-1228, (2017).