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Plasmonic curved waveguide sensor with ultrabroad detection range

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Plasmonic sensors have been the promising structure to provide high sensitivity on refractive index detection. However, their sensitivity is limited within the narrow bandwidth of device near resonance. Herein we introduce a novel structure about the improvement in detecting range of the refractive index through a high-contrast-index curved waveguide surrounding with an outer gold ring. The proposed detection technique is based on the output power measurement of the curved waveguide that offers a linear response over an ultra-broad range of the refractive index of a surrounding medium from $n = 1$ to 2.21. Meanwhile, the high refractive index resolution of 4.03×10^{-10} RIU is achievable for such the broad testing range. The application could be gas or aqueous chemical sensing. Furthermore, the proposed detection approach based on the optical power measurement is achievable by the integration with an on-chip photodiode so that such a

compact design could be a multifunctional and high sensitive sensor-on-chip device.

Biography

Chii-Chang Chen received his PhD in Université de Franche-Comté (France) in 1998. In 1998, he worked in Laboratoire d'Optique P.M. Duffieux of Besançon to study high-speed LiNbO₃ modulators. In 2002, he joined Institute of Optical Sciences of NCU as an Assistant Professor. He joined Friedrich-Schiller-Universität Jena (Germany) as a visiting researcher in 2005. He joined Université Paris 13 (France) as a visiting researcher in 2006, 2007, 2011 and 2018. He became Professor and Distinguished Professor of NCU since 2009 and 2010, respectively. His current research interests are nano-optics, photonic neural networks, photonic crystals and bio-sensors.

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