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## Flexible large-scale wireless ethanol sensor using metamaterial

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In this paper, a novel flexible tuneable metasurface absorber is proposed for large-scale remote ethanol sensor applications. The proposed metasurface absorber consists of periodic split-ring-cross resonators (SRCRs) and microfluidic channels. The SRCR patterns are inkjet-printed using silver nanoparticle inks on paper. The microfluidic channels are laser-etched on polydimethylsiloxane (PDMS) material. The proposed absorber can detect changes in the effective permittivity for different liquids. Therefore, the absorber can be used for a remote chemical sensor by detecting changes in the resonant frequencies. The performance of the proposed absorber is demonstrated with full-wave simulation and measurement results. The experimental results show the resonant frequency increases from 8.9 GHz to 10.04 GHz when the concentration of ethanol is changed from 0% to 100%. In addition, the proposed absorber shows linear frequency shift from 20% to 80% of different concentrations of ethanol.

## Biography

Sungjoon Lim received BS degree in Electronic Engineering from Yonsei University, Seoul, Korea, in 2002, and the MS and PhD degrees in Electrical Engineering from the University of California at Los Angeles (UCLA), in 2004 and 2006, respectively. After a Post-doctoral position at the Integrated Nanosystem Research Facility (INRF), the University of California at Irvine, he joined the School of Electrical and Electronics Engineering, Chung-Ang University, Seoul, Korea, in 2007, where he is currently an Associate Professor. From 2013 to 2014, he was a Visiting Scholar at Georgia Institute of Technology, Atlanta, USA. He has authored and coauthored more than 100 international conference, letter and journal papers. His research interests include engineered electromagnetic structures (metamaterials, electromagnetic bandgap materials, and frequency selective surfaces), printed antennas, substrate integrated waveguide (SIW) components, inkjet-printed electronics and RF MEMS applications. He is also interested in the modeling and design of microwave circuits and systems. He received the Institution of Engineering and Technology (IET) Premium Award in 2009, ETRI Journal Best Paper Award in 2014, and Best Paper Award in the 2015 International Workshop on Antenna Technology (IWAT). He was appointed as CAU Distinguished Scholar for 2014–2016.

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