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New plasmonic sensor for early cancer detection

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A new plasmonic sensor developed by researchers at the University of Illinois at Urbana-Champaign will serve as a reliable early detection of biomarkers for many forms of cancer and eventually other diseases.

The sensor has been proven reliable to detect the presence of the cancer biomarker carcinoembryonic antigen (CEA) to the magnitude of 1 nanogram per milliliter. Most humans carry at least some amounts of CEA with an average range of 3-5 nanograms per milliliter. The researchers chose to focus on CEA because its presence in higher concentrations is an early indicator of many forms of cancer, including lung and prostate cancers.

The device combines two sensing methods, which hadn't until this time been able to be used together. First, it uses a 3D multi-layer nanocavity in a nanocup array, which allows for the light to be stored in the cavity comprised of two metal layers surrounding one insulator layer.

Secondly, it uses plasmonic sensing, which detects sensitive nanoscale light-matter interactions with biomolecules on the device surface.

In the future, however, because of the portability and inexpensive nature of this method, it can be more easily administered to any patient at routine check-ups. This would allow those with an elevated concentration of CEA to be treated even before cancer cells spread in the body.