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Japanese scientists reveal potential of technology to detect cancer

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The scientists present a technique that makes use of the binding properties of aptamers, synthetic organic molecules acting as probes for cancer cells.



Researchers at Okayama University in Japan have reported in the journal Sensors and Actuators B: Chemical that terahertz radiation can be used to rapidly detect makers for breast-cancer cells. The scientists present a technique that makes use of the binding properties of aptamers, synthetic organic molecules acting as probes for cancer cells.

X-ray screening (mammography) is the standard detection technique but is not without risk as it involves exposure of a patient to ionizing radiation. Another approach for detecting breast cancer cells is based on terahertz (THz) radiation, which is sensitive to polar molecules like water — normal and cancer tissues do not have the same water content.

Associate Professor Toshihiko Kiwa (Okayama University, Japan) and Professor Tsuneyuki Ozaki (INRS : Institut national de la recherche scientifique, Canada) and colleagues have now discovered a way to increase the sensitivity of THz radiation for the detection of makers of breast cancer cells, implying that 'THz chemical microscopy' could become a powerful alternative screening technique.

The key principle underlying the method of Associate Professor Kiwa and colleagues is that cancer and normal breast cells bind and don't bind, respectively, to certain molecules known as aptamers. The aptamers consist of (single-stranded) DNA or RNA fragments; they have a high affinity for particular molecules — in the experiments of the team of Associate Professor Kiwa, these molecules were breast cancer cells.

Breast-cancer cells bound to aptamers have a different terahertz response than freestanding aptamers. This notion can be exploited to detect, with high sensitivity, breast-cancer cells.