

The CUNY Center for Advanced Technology In Photonics Applications (CUNY CAT)
Designated by NYSTAR, the New York State Foundation for Science, Technology and Innovation

Detecting Cancerous Tissue via Stokes Shift Emission Spectroscopy

A new diagnostic technique called Stokes Shift Emission Spectroscopy is much more sensitive than conventional fluorescence spectroscopy to detect cancerous bio-molecules and structures. The method grew out of seminal work done at The City College of New York for the past two decades. In 1984, CCNY researchers first demonstrated that light could be used to detect cancer from key molecules without removing tissue. This research breakthrough offers the potential to make optical biopsy the new medical frontier for cancer diagnosis and other medical applications.

For organic molecules, the peaks of absorption and emission occur at different wavelengths, and the emission band occurs at lower energy than the excitation band. This difference between the emission and absorption peaks, known as the Stokes Shift, depends in part on the polarity of the host environment surrounding the emitting organic molecule and coupling to their vibrational modes. The new detection method combines the fluorescence and absorption spectra of molecules in tissue.

The excitation and emission wavelengths are scanned simultaneously with a fixed value between the excitation and emission wavelengths. This approach is much more sensitive than ordinary fluorescence spectroscopy and has delivered dramatically improved results in detecting cancerous, pre-cancerous and normal tissues.

The two diagrams above demonstrate the effectiveness of the Stokes Shift Emission Spectroscopy (Ss) method over conventional fluorescence spectroscopy. It is clear that the Stokes Shift method is a more selective and effective means of distinguishing cancerous from normal tissue. It has the potential to detect tumors involving the breast, cervix, gastrointestinal tract, head and neck and other organs.

Note: Development and marketing partnerships are sought for this technology opportunity.

This technology opportunity sheet describes continuing efforts in this area. Several patents may have been issued or are pending and which may be available for licensing.

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