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Urokinase plasminogen activator detector helps monitor cancer

Savannah Mandel



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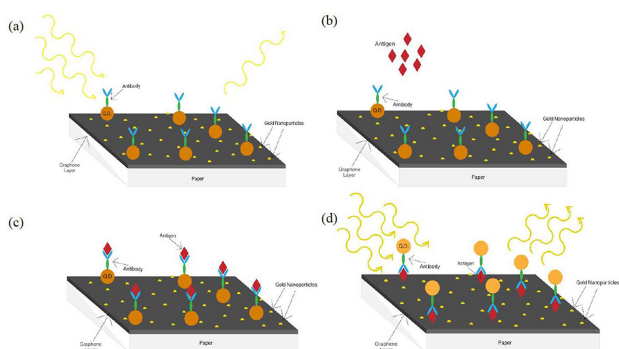


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A quick and flexible urokinase plasminogen activator detector leads to inexpensive detection and monitoring of cancer.



High levels of urokinase plasminogen activator (uPA) can indicate cancer metastasis. This protein converts plasminogen to an enzyme called plasmin, which causes the breakdown proteins in blood and the extracellular matrix. Degraded proteins in the extracellular matrix are a component of cancer movement and proliferation, indicating that through successful detection of uPA, scientists can monitor and diagnose cancer.

Sharma et al. developed a uPA sensing technique based on a paper-based, graphene-gold nanoparticle platform that can detect uPA with high specificity and high sensitivity. The device is physically flexible and inexpensive.

On the graphene and gold nanoparticle-based sensing platform, cadmium selenide quantum dots were coated with uPA antibodies. When the quantum dots are within ~20 nanometers from graphene, the graphene in the platform reduces the fluorescence of the quantum dots.

“When we add any biological fluid that may contain uPA, uPA binds to the antibody on the quantum dot. This causes a ‘lift’ of the quantum dot, taking it farther away from graphene, thus reducing the quenching [of the fluorescence],” said author Bipin Sharma. “This means that the addition of uPA disrupts quenching, thereby increasing the quantum dot fluorescence.”

The authors intend on further miniaturizing the device, which they believe can be integrated into a hand-held electronic device. The device's low sample volume would allow easy and accurate estimation of uPA levels in blood.

“In low- and middle-income countries, a majority of the population don't have access to state-of-the-art healthcare facilities, due to location and inaccessibility. With hand-held, point-of-care sensors, the people will have access to a diagnostic tool for them to detect diseases without having to travel very far or spend too much,” said author Ramakrishna Podila

Source: “Rapid detection of urokinase plasminogen activator using flexible paper-based graphene-gold platform,” by Bipin Sharma, Prakash Parajuli, and Ramakrishna Podila, *Biointerphases* (2020). The article can be accessed at <https://doi.org/10.1116/1.5128889>.

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