Functionalized Biosensor for Tissue Plasminogen Activator (tPA) Detection

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.Sensitive detection of bioindicator molecules is necessary for the early diagnosis of cancers and cardiovascular diseases. Field-effect transistor-based (FET) biosensors are instruments that measures biological or chemical parameters that offer a facile and sensitive alternative for biodetection. The inorganic compound Tungsten Diselenide (WSe2) is an ideal material for the creation of a FET biosensor, because it has semiconductor properties. The Plasminogen Activator protein (tPA) is an enzyme produced by the body that helps dissolve blood clots. It is commonly found over expressed in cancers and cardiovascular diseases. The objective of this research was to functionalize the WSe2 material to detect tPA with the purpose of generating a biosensor. Functionalization was done by silanization process with 3-aminopropyltrietoxysillano (APTES), adding glutaraldehyde and an antibody for tPA. The electrical current produced by WS2 was observed, measured, and analyzed to determine the functionalization of the material. The increase in the electrical current implies a successful functionalization of the material. The functionalization of WSe2 will allow the specific detection of tPA. This provides the opportunity to create a biosensor that can detect human tPA with high sensitivity and selectivity. Therefore, this research offers a potential new form of diagnosis and the possible implementation of a cost-effective commercial device for detecting diseases.

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