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Korea develops novel DNA biosensor for early diagnosis of cervical cancer

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The electrochemical sensor detects human papillomavirus (HPV)-16 and HPV-18, with high specificity

Molybdenum disulfide (MoS_2) has recently garnered attention among materials science researchers owing to its ability to form two-dimensional nanosheets like graphene. The nanosheets are created by the stacking of S–Mo–S layers interacting via Van der Waals interactions. Additionally, the unique structural, optical, thermal, and electrochemical properties of MoS_2 have opened up multiple research avenues across several fields, including the development of biomolecule sensing.

Against this backdrop, researchers from the School of Chemical Engineering and Material Science at Chung-Ang University, Korea have recently come up with an elegant solution. The team has developed an electrochemical DNA biosensor using a graphitic nano-onion/molybdenum disulfide (MoS_2) nanosheet composite, which effectively detects human papillomavirus (HPV)-16 and HPV-18, and can serve as an early diagnosis of cervical cancer.

Notably, the target DNAs produced from HPV-16 and HPV-18 Siha and Hela cancer cell lines were detected by the proposed sensor effectively and with high specificity. Consequently, MoS_2 nanosheets with improved electrical conductivity facilitated by complexation with nano-onions provides a suitable platform for developing effective and efficient electrochemical biosensors for the early diagnosis of a wide variety of ailments, including cervical cancer.

Furthermore, combining nano-onions or nanodiamonds with different organic biomaterials can facilitate chemical functionality, electron transfer conductivity, light absorption, and more. These, in turn, can lead to innovative disease sensing, targeted drug delivery systems, and biomedical imaging and diagnostics.