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Quantum Dot Biosensing for Advancing Precision Cancer Detection

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Abstract : In the evolving landscape of cancer diagnostics, optical biosensing has emerged as a promising tool due to its sensitivity and specificity. This study explores the potential of CdS/ZnS core-shell quantum dots (QDs) capped with 3-Mercaptopropionic acid (3-MPA), which aids in the linking chemistry of QDs to various cancer antibodies. The QDs, with their unique optical and electronic properties, have been integrated into the biosensor design. Their high quantum yield and size-dependent emission spectra have been exploited to improve the sensor's detection capabilities. The study presents the design of this QD-enhanced optical biosensor. The use of these QDs can also aid multiplexed detection, enabling simultaneous monitoring of different cancer biomarkers. This innovative approach holds significant potential for advancing cancer diagnostics, contributing to timely and accurate detection. Future work will focus on optimizing the biosensor design for clinical applications and exploring the potential of QDs in other biosensing applications. This study underscores the potential of integrating nanotechnology and biosensing for cancer research, paving the way for next-generation diagnostic tools. It is a step forward in our quest for achieving precision oncology.

Keywords : quantum dots, biosensing, cancer, device
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