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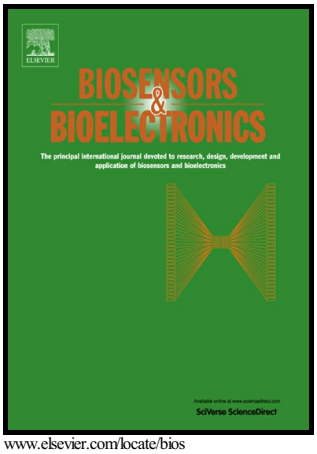

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An Ultrasensitive Photoelectrochemical Biosensor Based on $[Ru(dcbpy)_2dppz]^{2+}$/Rose Bengal Dyes Co-sensitized Fullerene for DNA Detection

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Abstract

Though preferable progresses have been achieved to improve the photoelectric performance of fullerene (C_{60} NPs) by sensitized structure in photoelectrochemical (PEC) field, further application inevitably suffers from the inherent scarcities of heavy metal-involved quantum dots as sensitizers containing restricted sensitization effect, complex preparation and biological toxicity. In this work, a PEC biosensor based on $[Ru(dcbpy)_2dppz]^{2+}$/Rose Bengal dyes co-sensitized C_{60} NPs was constructed for ultrasensitive DNA (a fragment sequence of p53 gene) detection. With the merits of low toxicity and accessible operation, $[Ru(dcbpy)_2dppz]^{2+}$/Rose Bengal dyes exhibited a further sensitization efficiency towards C_{60} NPs. Through modifying wide band gap C_{60} NPs with two narrower band gap dyes ($[Ru(dcbpy)_2dppz]^{2+}$ and Rose Bengal) to form a cascade-type energy band structure, the photoelectric conversion of C_{60} NPs was significantly improved and the visible light