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Haihua Wang, Mengjie Li, Yingning Zheng, Tao Hu, Yaqin Chai, Ruo Yuan



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

Haihua Wang, Mengjie Li, Yingning Zheng, Tao Hu, Yaqin Chai*, Ruo Yuan*

*Key Laboratory of Luminescence and Real-Time Analytical Chemistry (Southwest University),
Ministry of Education, College of Chemistry and Chemical Engineering, Southwest University,
Chongqing 400715, People's Republic of China*

E-mail address: yqchai@swu.edu.cn, (Y. Q. Chai)

yuanruo@swu.edu.cn (R. Yuan)

* Corresponding author. Tel.: +86-23-68252277; Fax.: +86-23-68253172.

Abstract

Though preferable progresses have been achieved to improve the photoelectric performance of fullerene (C₆₀ 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 C₆₀ 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 C₆₀ NPs. Through modifying wide band gap C₆₀ 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 C₆₀ NPs was significantly improved and the visible light

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