

Fluorometric immunoassay for detecting the plant virus *Citrus tristeza* using carbon nanoparticles acting as quenchers and antibodies labeled with CdTe quantum dots

ABSTRACT

Cadmium-telluride quantum dots (QDs) were conjugated to an antibody (Ab) against *Citrus tristeza* virus (CTV), while the coat protein (CP) of the CTV was immobilized on the surface of carbon nanoparticles (CNPs). Following immunobinding of the QD-Ab and the CP-loaded CNPs, the fluorescence of the CdTe QDs was quenched by the CNPs. This effect was exploited to design a detection assay for the CTV which was found more sensitive and specific than the existing enzyme linked immunosorbent assay (ELISA). The limit of detection was measured at about $220 \text{ ng} \cdot \text{mL}^{-1}$ of CTV. The Stern-Volmer plot of the CNPs-QD quencher pair showed a positive deviation from linearity which was ascribed to the presence of both static and dynamic quenching.

Keyword: Bioassay; Competitive quenching; Stern-Volmer relationship; ELISA; TEM; FTIR; CdTe; Synthesis; Bioconjugation