

Microwave-assisted rapid in-situ growth of gold nanoparticles on cationic cellulose nanofibrils: recyclable nanozyme for the colorimetric detection of glucose

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Novel microwave-assisted green in-situ synthesis of positively charged gold nanoparticles (AuNPs) supported by cationic cellulose nanofibrils (C.CNF) within 30 s and devoid of additional reducing agent is reported. Peroxidase activity of these positive AuNPs was studied and that appeared to be superior over its negative charged counterpart. Further the AuNPs@C.CNF is casted into a film which makes it reusable. Using TMB substrate, simple and sensitive colorimetric detection methods for H₂O₂ and glucose were established. Under optimal conditions, the linear ranges were found to be 0.5–30 μM and 1–60 μM, and the detection limits were 0.30 and 0.67 μM for H₂O₂ and glucose, respectively. The film was potentially reused for the detection of glucose up to five cycles without a decrease in the activity. Further, this technique was employed to quantify glucose in human serum samples, and the obtained results were comparable with those of the standard GOD-POD method.