Highly Efficient Cholesterol Biosensor Based on Low-Temperature Synthesized ZnO Nanoparticles

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We report here an easy and successful synthesis and detailed characterization of Zinc oxide nanoparticles by simple solution process at ~90 ^{0}C by using zinc acetate, LiOH, and HMTA. The detailed structural characterizations exhibited the nanocrystalline nature of as-synthesized products. A high-sensitive cholesterol amperometric biosensor based on the immobilization of cholesterol oxidase (ChOx) onto as-synthesized ZnO nanoparticles has been fabricated which shows a very high and reproducible sensitivity of 23.7 $\mu AmM^{-1}cm^{-2}$, detection limit (based on S/N ratio) 0.37 ± 0.02 nM, response time less than 5s, linear range from 1.0 ~ 500.0 nM and correlation coefficient of R = 0.9975. A relatively low value of enzyme's kinetic parameter (Michaelis-Menten constant) ~ 4.7 mM has been obtained which indicates the enhanced enzymatic affinity of ChOx to Cholesterol. To the best of our knowledge, this is the first report in which such a very high-sensitivity and low detection limit has been achieved for the cholesterol biosensor by using ZnO nanostructures modified electrodes.