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| Title | Nano-bio effects: Interaction of ZnO and DNA-bases | | |
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| Abstract |  |
| In this study, we report on the complex formation and characterization of nano-bio conjugates synthesized by the sol–gel chemical method. The nano-bio conjugates, consisting of inorganic ZnO nanoparticles (NPs) and organic nitrogenous bases of DNA (Thymine and Cytosine), are investigated using electron microscopies, molecular vibrational analysis and X-ray spectroscopies. In this experimental investigation, we used two basic nitrogenous bases of DNA – Cytosine, and Thymine. The X-ray diffraction patterns of both ZnO NP and the nanoconjugate (NJ) reveal a highly phase pure ZnO structure with negligible changes in the unit cell dimensions. The Raman peaks due to the molecular vibration of C2=O7 and C4=O8 sites of Thymine and C=O and N-H sites in Cytosine are shifted due to the cation affinity after the interaction with ZnO NPs. The shifted XPS spectra towards higher binding energies of the NJ divulge the atomic level interaction between the DNA bases and ZnO NPs at the surface. Moreover, the formation of NJs reduces the surface defect states of the ZnO NPs and increases the fluorescence properties by quenching the oxygen vacancy concentration. Thus, the current study on the interfacial properties of organic–inorganic conjugate materials opens new frontiers for developing novel nano-bio conjugate materials and their integration for targeted drug delivery, biomolecular sensing and therapeutic tools medicine applications. | |