**Abstract**

Surfactant induced silver–titanium dioxide core shell nanoparticles within the size range of 10–50 nm were applied in the antibacterial agent to inhibit the growth of bacterial cells. The single crystalline silver was located in the core part of the composite powder and the titanium dioxide components were uniformly distributed in the shell part. HRTEM and XRD results indicated that silver was completely covered by titanium dioxide and its crystal structure was not affected after being coated by titanium dioxide. The effect of silver–titanium dioxide nanoparticles in the inhibition of bacterial cell growth was studied by means of disk diffusion method. The inhibition zone results reveal that sodium alginate induced silver–titanium dioxide nanoparticles exhibit 100% more antibacterial activity than that with cetyltrimethylbromide or without surfactant. UV–vis spectroscopic analysis showed a large concentration of silver was rapidly released into phosphate buffer solution (PBS) within a period of 1 day, with a much smaller concentration being released after this 1-day period. It was concluded that sodium alginate induced silver–titanium dioxide core shell nanoparticles could enhance long term cell growth inhibition in comparison with cetyltrimethylbromide or without surfactant. The surfactant mediated core shell nanoparticles have comparatively rapid, less expensive and wider applications in modern antibacterial therapy.