



Controlled Release of Vancomycin from Silica Nanoparticles

Taro Naoi, Jonathan Fang, and Bruce S. Dunn

California Polytechnic State University, San Luis Obispo

and

Department of Materials Science and Engineering, UCLA

Scientists and engineers are constantly in search of novel drug delivery systems to increase clinical efficacy and patient compliance. Recently, researchers have explored innovative drug delivery systems using micro and nanoparticle carriers that are specially tuned to maintain drug release rates and induce site-selective release of drugs. The goal of our research was to synthesize, optimize, and characterize the encapsulation and controlled release of vancomycin from silica nanoparticles. Using a modified Stober method, silica colloids of less than 300 nm were synthesized. Silica is an ideal material for controlled release since it is biocompatible, resorbable, and can be synthesized at ambient temperatures. Silica particles were doped with vancomycin, a glycopeptide antibiotic used to treat infections caused by gram-positive bacteria. Like many drugs used to treat infections, a minimal inhibitory concentration (MIC) had to be maintained for the duration of its release. With these drug doped particles, we were able to exceed MIC for several days. Encapsulation efficiency and surface morphology were also studied. Current release data show promise for clinical applications. In the future, we would like to perform BET on the particles, as well as study the efficacy of our controlled release system *in vivo*, and compare it with traditional methods of drug delivery.