SSRL Seminar

Tuesday, August 24, 2010

11:00 – 12:30

SSRL Conference room -137-322

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My research group is actively employing viruses, flagella and bacteria to perform varying functions for the development of nanotechnology and nanomedicine. This talk will highlight our recent work in this area and focus on the use of genetically modifiable bacteriophage (also called phage) for targeted cancer treatment. Filamentous phage is a nanorod-like virus (~900 nm long and ~7 nm wide) that specifically infects bacteria and is non-toxic to human beings. It is assembled from a core of DNA surrounded by a shell of coat proteins. The coat proteins are encoded by the DNA, enabling the genetic modification of the surface chemistry of the phage. We first employ the phage display technique to identify phage having breast cancer cell targeting peptides that are fully displayed on the side walls. Two strategies are then adopted to explore the use of cancer targeting phage in targeted cancer treatment. The first is photodynamic therapy where cancer targeting phage is conjugated with a photosensitizer and the conjugate is used to selectively recognize and kill cancer cells through singlet oxygen produced in response to light irradiation. The second is photodynamic therapy where cancer targeting phage proteins are assembled around light-absorbing gold nanorods. The modified gold nanorods are used to selectively recognize and thermally destruct cancer cells when exposed to near infrared light. Our work shows that genetically modifiable biomacromolecules are unique players in the development of novel nanomaterials and nanomedicines.