

talk by Monica Berry aimed at biologists, biophysicists or materials people (length to suit schedule)

Nanocrystalline carbon dots as non-toxic fluorescent platforms for intracellular delivery

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In order to take advantage of functional nanomaterials for biomedical purposes, for example as markers or cargo-carriers, it is imperative that they are bio-available and both non-toxic and stable. Surface glycans modulate the uptake and intracellular destination of nanomaterials, e.g. quantum dots, and can affect cell function in a concentration- and topography-dependent fashion, through polyvalent interactions. We combined these characteristics into the synthesis of nano-crystalline, water-soluble, fluorescent carbon dots (FCDs), from cheap sugar starting materials. These FCDs are quasi-spherical, between 2 and 4 nm in diameter, fluorescent and photostable, and cell permeant. Amine-functionalized FCDs display some toxicity after 72 h of exposure at high concentrations: this toxicity is obviated by lactose functionalization of the surface. Sugar-functionalized carbon dots are non-toxic fluorescent intracellular delivery vehicles.