

NANOPARTICLES

Determining domains

GRAPHENE NANORI...

Hot and cold all over

PROTEIN CORONA

Particle size matters

NANOPHOTONICS

Son et lumière

PROTEIN CORONA

Particle size matters

Ai Lin Chun*Nature Nanotechnology* doi:10.1038/nnano.2011.177

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When nanoparticles are exposed to biological fluid, proteins can bind to the surface of the nanoparticle to form a protein corona, which affects how nanoparticles are internalized by cells and cleared from the body. The composition of the corona is thought to depend on the type, size and surface properties of the nanoparticle, but because the human plasma contains a complex mixture of nearly 2,000 proteins, understanding how the corona forms remains a challenge. Now, Richard Stauber and colleagues from various institutes in Germany and the Srinakharinwirot University in Thailand have shown that the binding of proteins depends critically on the size of the nanoparticle.

Stauber and co-workers incubated different sized silica nanoparticles for 1 h in human plasma obtained from healthy volunteers, and characterized 125 different proteins from the corona using liquid chromatography–mass spectrometry and computational analysis. In contrast to previous findings, they found that neither protein size nor charge determined which proteins bound to the nanoparticles, suggesting that electrostatic effects alone may not explain how the corona forms. Using bioinformatic tools, the bound proteins, lipoproteins and proteins involved in coagulation and the complement pathway were found to be enriched on the nanoparticles, whereas other proteins showed low binding affinities. The size of the nanoparticles determined quantitatively, but not qualitatively, the binding of 37% of all the proteins identified.

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