Oliver G Schmidt, J Nanomed Nanotechnol 2016, 7:4 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.039

9th Nano Congress for Next Generation

August 01-02, 2016 Manchester, UK

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Microtubular nanomembrane architectures: From 3D assembly to paradigm shifting technologies

Nanomembranes are thin, flexible, transferable and can be shaped into 3D microtubular nanomembrane architectures. This makes them attractive for a broad range of applications and scientific research fields ranging from novel hybrid heterostructure devices to ultra-compact 3D systems both on and off the chip. If nanomembranes are differentially strained, they deform themselves and roll-up into microtubular structures upon release from their mother substrate. Rolled-up nanomembranes can be exploited to rigorously compact electronic circuitry and energy storage units. They can also serve as ideal platform to study novel photonic and plasmonic phenomena. As rolled-up microtubes can be easily tuned into the size range of single cells, they are perfectly suited to study single cell behavior in ultra-sensitive yet fully integrative lab-in-a-tube systems. As off-chip components they address exciting environmental and biomedical applications such as biomimetic regenerative cuff implants or powerful self-propelling microautonomous systems. If magnetic tubes or helices are combined with spermatozoa, such hybrid micro-biorobotic motors offer new perspectives towards paradigm shifting reproduction technologies.

Biography

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