SingNano – Singapore Nanotechnology Network
NEWSLETTER

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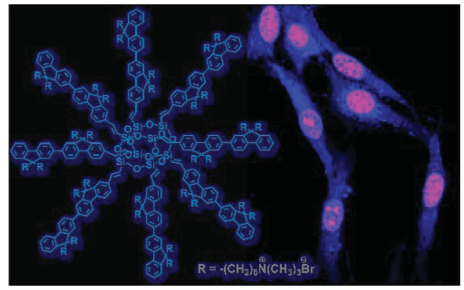
harvesting energy donor, visualization of the entire cellular structure with weakly-emissive dyes becomes possible. This invention thus provides new opportunities to improve the performance and quality of fluorescence technologies for biological imaging through energy transfer approach using hybrid nanomaterials as the signal amplifiers. From the materials viewpoint, the emission wavelength, charge nature and diameter of POSS-based fluorescent nanoparticles can be easily adjusted through chemical modification of fluorescent arms so as to fulfill the different requirements of specific applications. In terms of materials applications, the high quantum yields and good signal amplification capability of POSS-based molecules can bring in high-quality biological images even with a small amount of indicator dyes, consequently avoiding the side effect of elevated dye concentrations.

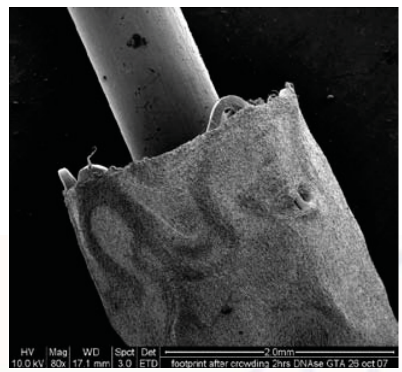


For more information, please refer to: K. Y. Pu, K. Li, B. Liu, Adv. Mater. 2009, on line, DOI: 10.1002/adma.200902409

Stents coated with Electrospun Nanofibers (Prof. Seeram Ramakrishna's group, contributed by NUS Industry Liaison Office)

A team from NUS Nanoscience and Nanotechnology Initiative (NUSNNI) has produced an aligned nanofiber-covered stent. The electrospun aligned nanofibers are deposited longitudinally along the traditional bare metal stent. This allows the ease of stent expansion during deployment, while significantly reducing tears and other deformations in the nanofiber coating.

These nanofiber encased stents can be substituted for uncoated or drug-coated stents currently in use. Flexibility of the configuration permits this invention to be used merely as a physical support or to serve an additional function of delivering drug. Drugs may be easily incorporated into the nanofiber matrix and can be delivered if needed, in a slow-release, long lasting manner. These nanofiber covered stents have the inherent property of reducing vessel injury during and after implantation, due to reduced friction, physical resistance and turbulence-induction compared to conventional products. In addition to treatment of CHD, physicians can use these stents to treat abdominal aortic aneurysms, thoracic aortic aneurysms as well as aneurysms in other locations.



SEM image of a stent coated with aligned nanofibers in an expanded state.

Nanofibrous Materials for Tissue Engineering, Wound Dressing & Dermal Reconstruction (Prof. Lim Chwee Teck's group, contributed by NUS Industry Liaison Office)

An invention developed by a team from Division of Bioengineering offers a cost-effective composite, to be used for dermal wound healing. This consists of a nanofibrous scaffold, made from a polymer blend of poly(ε-caprolactone) (PCL)/gelatin, directly electrospun onto a polyurethane dressing (Tegaderm™, 3M Medical) –the Tegaderm-nanofiber (TG-NF) construct. This invention can benefit patients by providing faster wound healing with no scarring at a lower cost.

PCL used in the PCL/gelatin nanofibrous scaffold is a soft-and-hard tissue-compatible bioresorbable material. It is also biodegradable. Thus, in vitro and in vivo biocompatible and efficacy studies on medical and drug delivery devices composed of PCL have received FDA approval. PCL/gelatin overcomes the shortcomings of natural and synthetic polymers, resulting in a new biomaterial with good biocompatibility and improved mechanical, physical and chemical properties. Culturing of cells on both sides of the nanofibrous scaffold construct resulted in a fibroblast-populated 3-dimensional dermal analogue with maximized cell loading, mimicking extracellular matrix.