Frontier Chemistry Center
フロンティア化学教育研究センター

講演会

演 題：**Biodegradable tissue scaffolds and coronary stents using nano-/micro-fibrillar polymer composites approach**

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日 時：2016 年 10 月 24 日（月）16:00~17:30

場 所：フロンティア応用科学研究棟セミナー室 1

要 旨：

In several branches of the medical field, from cardiology to orthopaedics to tissue engineering, there has been an increasing trend in the use of biodegradable materials in place of traditional, biostable materials, such as metals, ceramics and synthetic polymers. Biodegradable polymers and their composites are prominent in these areas and are of great interest for research because there is much room for improvement. This paper will focus on the applications of nano-/micro-fibrillar polymer composites in tissue scaffolds and bioabsorbable stents. It discusses the various aspects of manufacturing and the product performance under different situations.

Poly(L-lactic acid) (PLLA) is also a common material under investigation for tissue scaffolds. A large proportion of work in this area focuses on electrospinning to create tissue scaffolds but this process requires the use of organic solvents, which leave undesirable traces even after washing. This paper discusses a novel way of manufacturing scaffolds without the use of organic solvents. The process involves drawing of an extruded polymer composite filament to fibrillate the dispersed phase. After producing a network of nano-/micro-fibrils through a common manufacturing technique, the matrix is removed via dissolution in water, leaving a 3-D fibrillar, nanoporous network. This network can be used as a tissue scaffold with the advantage of having no residual organic solvent content. The in-vitro cell culture results using bone and tendon cells show some excellent prospects for these solvent-free novel scaffolds.

PLLA is also prominent in the field of bioabsorbable stents but it suffers from brittleness which must be mitigated. One method of doing this is to blend PLLA with rubbery polymers for creating ductile blends which strike a balance among ductility, strength, modulus and degradation characteristics. However, some of these properties and creep characteristics get affected by the degradation process. Blending another polymer and in-situ fibril creation are shown to go a long way to mitigate some of these problems.

本講演は、大学院総合化学院『化学研究先端講義（修士課程選択科目）／総合化学特別研究第二（博士後期課程選択科目）』の一部として認定されています。

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