Fraunhofer ISC

FRAUNHOFER INSTITUTE FOR SILICATE RESEARCH ISC

TiPLA – A BIOHYBRID FIBER

Owing to its excellent corrosion resistance and biocompatibility, titanium is widely used for non-resorbable implants – in the hip area alone, the number of annually implanted titanium prostheses reaches over a million. The remarkable biocompatibility originates in a thin surface layer of just a few nanometers of hydrated oxides. A combination of (hydrated) titanium oxide with organic molecules results in a biocompatible composite material.

The processing of the biohybrid material into a three dimensional fiber scaffold suitable for ingrowth of human cells is a promising approach to new applications in regenerative medicine.

The development of biohybrid materials

The combination of titanium alkoxides with lactic acid leads to a biohybrid continuous filament on the basis of (hydrated) titanium oxides wtih biodegradable properties. By varying the ratio of inorganic and organic fractions in the fiber formula, the property profile of resulting fibers can be tuned to match the target application. It is also possible to integrate active substances in the fiber matrix or to adjust the hydrophilic or hydrophobic behavior of the material.

Spinning technology

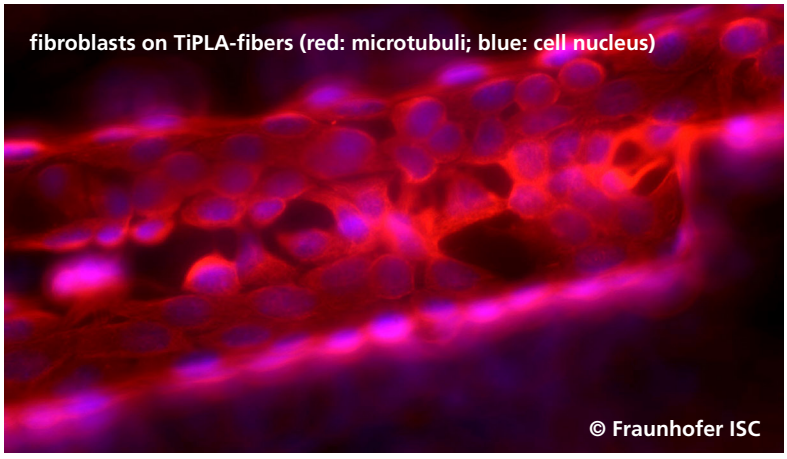
A wet-chemical synthesis allows producing continuous filaments which can be spun onto a roll or directly processed into a fiber fleece. Fiber diameters can vary from 20 to 120 µm.

Biocompatibility

The fiber-form biomaterial proves to be non-cytotoxic following DIN ISO 10993-5. Cell culture experiments on the material show proliferation of different cell types on the fiber surface.

Application areas

- Scaffolds in Tissue Engineering
- Regenerative Medicine
- Drug Delivery
- etc.



fibroblasts on TiPLA-fibers (red: microtubuli; blue: cell nucleus)

Fraunhofer Institute for Silicate Research ISC
Neunerplatz 2
97082 Würzburg | Germany

Dr. Sofia Dembski
Phone +49 931 4100 516
sofia.dembski@isc.fraunhofer.de

Dr. Jörn Probst
Phone +49 931 4100 300
joern.probst@isc.fraunhofer.de

www.isc.fraunhofer.de