Technology Offer

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EMPA
Materials Science & Technology

Structured ceramic and polymer/ceramic composite fibres

Invention

The invention presents a new extrusion/spinning technology for the production of polymer/ceramic and ceramic fibers. Due to the unique features of the feedstock materials and shaping processes, production of small diameter (micro)structured fibers, tubes or tapes becomes possible. Custom made, cost effective and manufacturable solutions for continuous length ceramic and composite fibers with diameter in the 10-1000 micrometer range and for non-woven applications below 10 micrometer become available.

Background

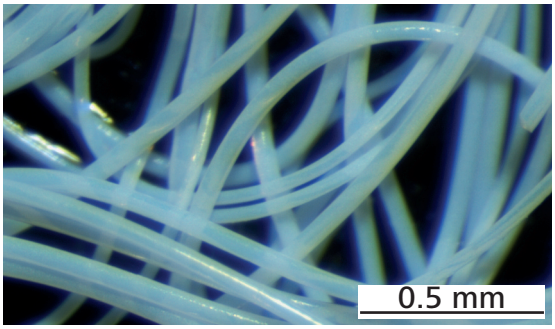
Ceramic and polymer/ceramic composite fibers find applications in textiles and fabrics, electronics and optics, sensing and detection, separation/filtration and catalysis technologies, renewable energy solutions, and smart materials and devices. These ever-evolving and versatile applications require new and general approaches to produce fibers with increased complexity, material combinations and microstructural control. To meet these demands, a general and versatile process to produce continuous polymer, polymer/ceramic and inorganic fibers/tapes and devices with 3-d control has been developed.

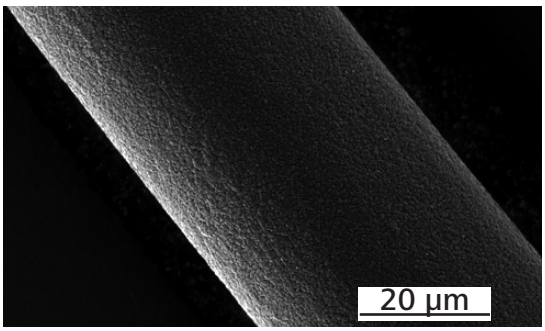
Advantages

Compared to conventional extrusion processes, the new technology can produce fibers, tubes and tapes with smaller dimensions and greater flexibility. With the new shaping/structuring process it is possible to produce ceramic and polymer/ceramic fibers, tubes and tapes from a wide range of ceramic materials. Metallic, functional or other materials can be added as well. Continuous composite fibers with tailored properties (e.g. elasticity) can be produced. These may be assembled or weaved into fabrics or devices. The method is particularly attractive for fibers and devices requiring several layers of different materials and those requiring complex three-dimensional geometries.

Applications

Cost-effective and manufacturable solutions for simple and complex, continuous nanocomposite and inorganic fibers in the 10–1000 micrometer range are available. Specific applications depend on choice of materials and shapes. We offer custom made solutions for applications in textiles and fabrics, electronics and optics, MEMS, sensing and detection, separation/filtration and catalysis technologies, renewable energy solutions and bio-compatible materials. The possibilities to combine different functional materials (e.g., electrical, optical, magnetic, catalytic) into different layers are attractive for applications such as smart materials and devices.





Ownership

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Keywords

Ceramic, inorganic/polymer nanocomposite, weave, microstructure, fiber, tube, tape

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