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Hybrid multi-material optical fibers

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The recent development of thermally drawn fibers that combine prescribed structures of materials with different optical and optoelectronic properties has enabled a novel path towards large area and flexible photonic systems. Complex optoelectronic functionalities can be achieved by combining all of the required materials into a macroscopic preform and using the thermal drawing process to stretch this preform into very long, thin and flexible functional fiber devices. Micro- and nano-structured devices with widely different optical and electrical properties, in prescribed position and with intimate interfaces, have been demonstrated with this approach. These include sub-hundred nanometers electrically connected semiconducting thin-films that can act as light, heat, or chemical sensors, field effect structures, piezoelectric micro-domains and even extremely long nanowires and complex nano-spheres. In that regard, the thermal drawing technique represents a unique ability to tailor materials, structures and properties spanning the nanometer to kilometer length scales, making these fibers compelling candidates for applications such as remote and distributed sensing, large-area optical-detection arrays, energy harvesting and storage, innovative health care solutions, and functional fabrics. In this talk, we will present the materials and fabrication approach, and discuss various opportunities and fiber structure examples that has been achieved. We will also highlight some directions that the field may take in terms of new materials, structures and functionalities.

Biography

Fabien Sorin obtained his PhD from the department of Materials Science at the Massachusetts Institute of Technology (MIT), Cambridge USA. After a three-year Post-doc at the Research Laboratory of Electronics still at MIT, he joined the company Saint-Gobain and work as a research scientist at the Saint-Gobain Research center in Aubervilliers, France. In 2013, he joined the Ecole Polytechnique Fédérale de Lausanne (EPFL, Switzerland) as an Assistant Professor in the Institute of Materials, where he leads the Photonic Materials and Fiber devices laboratory.

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