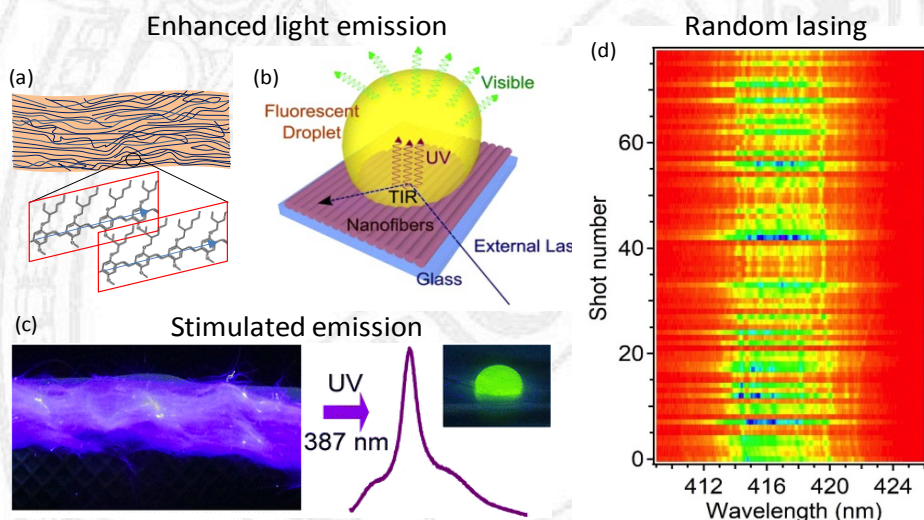


## Nanofabrication technologies for organic materials and optically active polymer systems

Polymer nanostructures based on organic compounds are interesting for a variety of fields, including photonics, lasers, optical sensing, energy harvesting and nanoelectronics. As optical media, 1-dimensional polymer nanostructures, such as nanofibers and nanowires, have intriguing and specific properties: they can embed metal nanoparticles, quantum dots and molecular light sources, they can transport light among distant optically-active nanostructures and they can be deposited in 2-dimensional and 3-dimensional architectures in a controlled fashion, forming complex networks of interacting photon sources. Here, fundamentals of the electrospinning and nanopatterning methods, including printing technologies, developed in our group will be presented and discussed as well as recent results on active polymer nanostructures. Investigated properties include light-confinement, waveguiding, multiple scattering, stimulated emission, random lasing and anisotropy of energy migration. The research leading to these results has received funding from the European Research Council under the European Union's Seventh Framework Programme (FP/2007-2013)/ERC Grant Agreement n. 306357 (ERC Starting Grant "NANO-JETS", [www.nanojets.eu](http://www.nanojets.eu)).



(a) Schematics of the orientation of conjugated polymer chains in polymer nanofibers [A. Camposeo et al., *J. Am. Chem. Soc.* **138**, 15497 (2016)]. (b) Schematics of microdroplet optical excitation by UV-emitting nanofibers. (c) Photograph of a UV-emitting nanofiber sample (left image) and example of a stimulated emission spectrum (right graph) [G. Morello et al., *ACS Appl. Mater. Interf.* **7**, 5213 (2015)]. (d) Examples of random lasing spectra from nanofibers [V. Resta, et al., *Opt. Express* **25**, 24604-24614 (2017)].

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**October 23<sup>rd</sup>, 12:00pm**  
**DICAr MS1 Meeting Room**  
Via Ferrata, 3 – Pavia