Scuola di Dottorato in ICT

Doctoral School in ICT

Research project for a PhD curriculum in ICT – Electronics and Telecommunications

**Tutor**: L. Vincetti

**Proposed Title of the research: “Development of innovative sensors for liquid and gas sensing based on hollow core optical fibers”**

**Keywords: (3) Optical Fibers, Photonic Crystal Fibers, Plasmonics, Optical sensors**

**Research objectives: --(max 10 rows)**

• Theoretical investigation of new and innovative HC-PCFs for liquid and gas sensing

• Realization and characterization of HC-PCFs

• Development of effective measuring systems based on HC-PCFs.

**Proposed research activity --(max 10 rows)**

There is a growing interest in developing compact, high sensitivity, and real time sensors for environmental, chemical and biochemical sensing. Usually the analyte is dissolved in an aqueous solution or in a gas. At present most of the liquid and gas sensing techniques tend to be bulky, costly and lack real time data measurement. Hollow Core-Photonic Crystal Fibers (HC-PCFs), thanks to their holey structure, constitute an effective alternative. When the fiber hollow core is filled with liquids or gases, long interaction lengths between the filed propagating through the fiber and fluids can be readily achieved, thus enabling high detection sensitivity. HC-PCF with nanowires or surface metallization can also exploit surface plasmon resonance in order to further enhance the sensitivity.

**Supporting research projects (and Department )**

The research activity will be carried on in the PhEm lab of the Department of Engineering “Enzo Ferrari” and it si in the framework of the project “Innovative materials, devices, and processes for industry 4.0” funded by “Regione Emilia-Romagna”, Italy in collaboration with Technopole of Mirandola-TMP (It), University of Parma (It), University of Ferrara (It), and XLIM - University of Limoges (Fr).

**Possible connections with research groups, companies, universities..**

Technopole of Mirandola-TMP (It), University of Parma (It), University of Ferrara (It), and Research Institute XLIM - University of Limoges (Fr).