

Proposta tesi triennale/magistrale

Inorganic perovskites: new materials for advanced photonics

In the last decade a significant effort of research in physics and chemistry has been directed to the development and study of new materials for applications in the fields of photonics and energy harvesting. Perovskites (PSK) are for sure one of the most promising class of materials for such applications since their composition and design can be tuned to satisfy requirements as:

- a) high efficient radiative recombination;
- b) tunability of the emission to cover the range from UV to NIR;
- c) design of the material structure (bulk/micro/nanostructures)
- d) low-cost and easiness of synthesis and deposition.

Nevertheless, hybrid organic-inorganic perovskites suffer of a poor material stability due to the organic part. On the contrary, all inorganic perovskites (IPSK) guarantee a significantly improved stability, opening the route for large scale applications. I-PSK seminal work dates back to 2015, so a huge experimental and theoretical work is needed for a significant scientific and technological advancement.

In this project we propose an experimental study by means of high resolution optical spectroscopy of IPSK structures with emission energies in the VIS-NIR and limited inhomogeneous broadening (≤ 5 meV) to demonstrate their integration in microcavities and photonic structures so to control and optimize the light extraction and the spatial emission characteristics.

Even though the topic requires a background of knowledge (master student) a bachelor thesis can be tailored with a more limited experimental investigation.