

**Scuola Superiore di Catania**

**CORSO SPECIALISTICO**

**Ambito Scienze e tecnologie**

**a.a. 2016-2017**

**Functional nanostructures: from microelectronics to biomedicine**

The course will focus on the development of cheap and scalable chemical synthetic approaches of functional nanostructures going from novel synthetic routes such as atomic layer deposition (ALD) and solutions approaches, to their functional properties. In particular, target of the course will be nanostructured materials of various dimensions with properties useful for applications in electronics, optoelectronics and biomedicine. 2-D nanostructures with piezoelectric properties will be investigated as layers for integrated and miniaturized optical (waveguides), acoustic [Surface acoustic waves (SAW), bulk AW, thin-film bulk acoustic resonator (FBAR)], photonics and micro-electromechanical systems (MEMS) devices. 3-D nanostructures will be investigated starting from the synthetic approach to their luminescent properties, such as upconversion, that render them very appealing for applications in biomedicine as nanothermometers. Luminescent inorganic nanoparticles of fluoride phases may be applied for thermal sensing not only to understand the dynamics of biosystems, highly depending on their temperature, but also for the early detection and treatment of many diseases.