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Optical sensing based on micro-scale resonators

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The whispering gallery mode phenomenon has attracted many scientists since was discovered by Lord Rayleigh in the 20th century in the San Paul cathedral in London. The high-quality factor together with the micro-scale dimensions of the resonator is fundamental for sensor's applications. The light trapped inside a micro-resonator travels through total internal reflection generating the whispering gallery modes (WGMs) or morphology dependent resonances (MDRs). The optical modes are highly sensitive to the morphology of the resonator and any external event that induces a change in size, shape, and index of refraction of the micro-resonator leads to a shift in its optical modes. Therefore, the induced WGMs shifts can be related to the applied external event. In most applications, the coupling between the light and the micro-resonator is made using a single mode optical fiber connected to one end to a tunable diode laser and connected to the other end to a photodiode; on the other hand, wireless coupling is used in measurements where cabling tends to be problematic; in this case, a dye doped micro-resonator which acts as a tiny laser is used.

Biography

Maurizio Manzo is a new Assistant Professor joining the Department of Engineering Technology at the University of North Texas-UNT in fall 2017 and the Founder and Director of its Photonics Micro-Devices Fabrication Laboratory. He previously covered the position of Lecturer at Texas A&M University-Kingsville where he taught courses such as heat transfer, continuum mechanics, finite element methods, and control systems. He received a PhD in Mechanical Engineering from Southern Methodist University, Texas in 2015 and both MS and BS in Aerospace Engineering from Universita' degli Studi di Palermo, Italy in 2011 and 2009 respectively. His research focuses on sensors development, instrumentation and flow diagnostics, and biomedical micro-devices. He has published papers in reputed journals and is a Member of ASME.

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