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**Talk title:** Fiber optic sensors for healthcare applications: fundamentals, applications and frontiers

**Abstract:** Sensing solutions based on optical-fibre technology exhibit numerous advantageous features, which make them ideally suited for a broad variety of applications in life sciences, medical monitoring and diagnostics. Fiber optic sensors (FOSs) are indeed characterized by small size (diameter in the order of tens to hundreds of  $\mu\text{m}$ ), lightness, flexibility, high accuracy, intrinsic safety, compatibility with diagnostic systems, immunity to external electromagnetic fields, no voltage or current flow in the fiber, possibility of continuous monitoring, and multiplexing capabilities. These features are highly desirable for healthcare monitoring and application in the biomedical field.

FOSs are mostly used for thermal and mechanical measurements of biomedical quantities, such as biomechanical parameters, pressure, and physiological or supraphysiological temperature reached during thermal therapies for cancer treatment. Moreover, the combination of the fiber optic technology with nanomaterials has opened the door to the design of novel sensors based on surface plasmon resonance or lossy mode resonance, which are mostly oriented to biosensing, and are studied to detect pathological cells or the presence of dangerous substances in the body and in living environments.

This lecture will present a broad spectrum of applications of FOSs to be used for healthcare applications, including: thermometry during thermal therapies in oncological field, the monitoring of prosthetic devices, the development smart patches. FOS-based biosensing applications for the detection of biomolecules and environmental quantities will also be introduced and discussed.

**Short Bio:** Paola Saccomandi obtained the PhD in Biomedical Engineering in 2014 from Università Campus Bio-Medico di Roma. Currently, she is Associate Professor at the Department of Mechanical Engineering of Politecnico di Milano. In 2021 she obtained the National Academic Qualification as Full Professor (Measurements).

She is now the Head of Laboratory of Measurements for Biomedical Applications (10+ members), working on the development of light-based approaches for hyperthermal tumor treatment and monitoring, quasi-distributed fiber optic sensors and imaging, thermal and biomechanical measurements.

Currently, she is the PI of 2 European Research Council (ERC) projects and 2 national grants, supervisor of 1 Marie Skłodowska-Curie Actions (MSCA) postdoctoral fellowship, and task leader of other 4 national grants.

Presently, Paola is the Chair of Women in Sensors (WiSe) Committee, the Chair of IEEE EMBS Technical Community on Therapeutic Systems & Technologies, and the vice-chair of IEEE Women in Engineering (WIE)-Italy Affinity Group. In 2018, she was co-founder and officer of the IEEE Italy Sensors Chapter. She is IEEE senior member, and SPIE life member. She is Distinguished Lecturer for IEEE Sensors Council (2024-2026).

She served as Technical Program Chair for IEEE MetroInd4.0&IoT 2020 and 2021, and MeMeA 2021. She was recipient of several awards, including Premio Italia Giovane. She co-authored more than 200 papers and books, with over 4900 citations and h-index of 38 (Google Scholar).