



**Finanziato
dall'Unione europea**
NextGenerationEU

Piano Nazionale di Ripresa e Resilienza

Missione 4 - Componente 2 - Investimento 1.1

«Progetti di Ricerca di Rilevante Interesse Nazionale»

Title of the project

BiOmimetic fluorinated nanoProbes for multiscale Tumor detection by MRI
and Advanced Raman techniques
(OPTIMA)

Scientific Investigator

Digilio Giuseppe

CUP code

C53D23003730006

“Soggetto attuatore”

UNIVERSITA' DEL PIEMONTE ORIENTALE

Via Duomo 6, Vercelli (VC) – 13100

Abstract

The OPTIMA project focuses on developing biomimetic fluorinated nanoparticles (FNP) as bimodal imaging probes for solid tumor detection using ^{19}F -MRI and Raman spectroscopy. By designing FNP with enhanced fluorine content and cell membrane coatings, the project aims to improve tumor targeting and imaging sensitivity at multiple scales, from whole-body MRI to high-resolution Raman analysis. Advanced deep Raman techniques like micro-SORS and TD-DRS will be optimized for reliable in vivo detection. A proof-of-concept in a murine breast cancer model will demonstrate the approach's potential for noninvasive tumor visualization and surgical guidance. Beyond oncology, OPTIMA's fluorine-based imaging strategy holds promise for diverse biomedical applications and clinical translation.
