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Upconversion nanocrystals to improve imaging and chemical sensing of disease biomarkers

(*Nanowerk News*) Upconversion nanocrystals are a novel contrast agent used in imaging and chemical sensing of disease biomarkers. While their unique properties are promising for converting infrared light into visible light, their implementation has been limited by their low brightness and reduced color tenability. Thus, they are still in need of further exploration to improve the quality of output.

With the help of a $341,694 grant from the National Science Foundation, "Establishing the Crystallochemical Principles Governing Energy-Transfer Processes in Upconversion Nanocrystals," a Wayne State University researcher aims to improve upconversion nanocrystals' composition and atomic structure to expand the library of bright and multicolor upconverters, while also generating fundamental understanding of light-matter interactions at the nanoscale.



This is Dr. Federico Rabuffetti, Assistant Professor of Chemistry at Wayne State University.

Federico Rabuffetti, Ph.D., assistant professor of chemistry in the College of Liberal Arts and Sciences, will focus on establishing relationships between the chemical composition, atomic structure and luminescence of upconversion nanocrystals, with the goal of designing bright and color-tunable emitters.

"The project takes advantage of the versatility of a series of nanocrystals whose composition and atomic structure can be finely controlled, and is anticipated to expand the library of bright and multicolor upconverters while also generating fundamental understanding of light-matter

interaction at the nanoscale," said Rabuffetti. "Ultimately, we aim to improve the quality of imaging and chemical sensing of disease biomarkers, which will lead to better diagnosing and treatment plans for numerous health issues."

The project offers workforce development opportunities at the undergraduate and graduate levels by training students in the synthesis and advanced characterization of luminescent nanomaterials. For undergraduates, these training opportunities will be integrated in Wayne State's Nanoengineering Undergraduate Certificate Program.

The grant number for this National Science Foundation award is 1606917.

Source: *Wayne State University*

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