Post-doctoral position (36-month, ERC CoG “sCiSsoRS”) for the development of nonlinear microscopy in the field of cancer diagnostics in Marseille from September 2024

A postdoctoral position is available from beginning of **September 2024** at the Institut Fresnel in Marseille, France, an academic joint laboratory of Aix-Marseille University, CNRS and Ecole Centrale.

Our mission

Our recent advances in coherent Raman microscopy allow for real-time generation of artificially stained images of cancer samples which previously required time-consuming histopathological staining procedures. These images serve as feedback for surgeons to guide cancer surgery. However, the examination of thick samples remains a major challenge for coherent Raman microscopy because the excitation light must pass through the sample. Within this project, you will develop a new coherent Raman technique called coherent Stokes Raman scattering (CSRS) microscopy. As the game-changer, CSRS will send the signal photons directly into the backward direction enabling the investigation of thick, non-transparent cancer samples. Moreover, we will use CSRS’ backscattering property to record the CSRS spectrum of tissue at unprecedented acquisition rates. Novel spectrometer concepts, multi-focus and wide-field illumination approaches will be put in place. Precise diagnoses of cancerous tissues will be derived from these CSRS spectra by machine learning algorithms. Your mission is to set up and characterize backscattering CSRS microscopes and evaluate their functionality on cancer tissue. Your tasks will include:

- **Construction** - You will build from scratch one or more new coherent Stokes Raman microscopes.
- **Simulation** – You will simulate your experiments in Matlab or Python. We work in close cooperation with theoretical physicists.
- **Experiments** - You will examine cancer samples with your microscope and predict the malignancy of the tissue with the help of our machine learning experts.

Your profile

Attitude: For you, research is a vocation. High levels of initiative, creativity and curiosity are expected from you.

Willingness to perform: During university education you were always in the top 25% and you should have at least 2 major publications as first author.

Qualification: You have completed a degree in the field of photonics, e.g. physics, physical chemistry or similar. You have developed microscopy techniques or other imaging methods during your doctorate or former postdoc position.

Language: The communication between scientists happens in English. Knowledge of French for everyday use can be acquired when you have started your position.

The offer

Resources & interest: Your project is funded by an ERC Consolidators' grant (sCiSsoRS, 2.4Mio€). You will work with state-of-the-art equipment and your results are of high general interest.

No multitasking: You can focus 100% on research. No teaching obligations.

Team spirit: You will be part of a high-performing, international group of 10 independent scientists working in a team with 30 postdocs and PhD students to advance cutting-edge research in biomedical imaging.

Supervision: You will be in close contact with your supervisor. Upcoming challenges are addressed on the same day.

Salary: You will benefit from a competitive European salary level, ≥ 2400€ negotiable.

Related Publications

1. Sandro Heuke et al. "Coherent Stokes Raman scattering microscopy (CSRS)." Nat. Commun. 14, 3337 (2023).
2. Sandro Heuke et al. "Shot-noise limited tunable dual-vibrational frequency stimulated Raman scattering microscopy," Biomed. Opt. Express 12, 7780-7789 (2021).
3. Eric M.Fantuzzi, Sandro Heuke et al. "Wide-field coherent anti-Stokes Raman scattering microscopy using random illuminations. " Nat. Photon. (2023).

Homepage: https://www.fresnel.fr/

Curious? Please send a letter of motivation, a detailed CV, a reference letter and 3 academic references to Sandro.Heuke@fresnel.fr.