The Nanoscience Cooperative Research Center, CIC nanoGUNE, located in Donostia / San Sebastian, Basque Country (Spain), is currently looking for a

MASTER STUDENT
to work on
GV_IKERBASQUE_Fellow_CIC02_Schnell

NanoGUNE is a research center devoted to conducting world-class nanoscience research for a competitive growth of the Basque Country. NanoGUNE is a member of the Basque Research and Technology Alliance (BRTA) and is recognized by the Spanish Research Agency as a *María de Maeztu* Unit of Excellence.

The **position** is offered in the Nanooptics Group, led by Hillenbrand, Rainer (r.hillenbrand@nanogune.eu). The Nanooptics Group performs experimental and theoretical research in Nanooptics and Nanophotonics, covering both fundamental and applied aspects. Essentially, we develop near-field nanoscopy (scattering-type scanning near-field optical microscopy, s-SNOM) and infrared nanospectroscopy (Fourier transform infrared nanospectroscopy, nano-FTIR), and apply these novel analystical tools in different areas of science and technology. Both techniques offer a wavelength-independent spatial resolution of about 10 to 20 nm spatial resolution at visible, infrared and terahertz frequencies, thus beating the conventional resolution (diffraction) limit by a factor of up to 1000..

The candidate will join a **research line** focusing on the instrumental developments, plasmonics and phononics, IR nanospectroscopy as well as the nanooptics theory. More information can be found at https://www.nanogune.eu/nanooptics.
The aim of the **project** is to - Project: CIC022020002 - GV_IKERBASQUE_Fellow_CIC02_Schnell

- Work Plan: The goal of this Master project is to explore infrared nano-imaging for bioimaging applications. The specific goals of this project are to
? Test and select the best parameters for infrared nano-imaging
? Resolve chemical composition and morphology of biological cells at the nanometer scale

The results of this project will help us to understand if infrared nano-imaging can be used to diagnose disease. So far, clinical pathology has relied on adding dyes to human tissue biopsies and using an optical microscope to see the patterns of organization and shape of normal and cancer cells to diagnose tumors. However, the shape and color induced by the dye provide very limited information about the underlying molecular changes that drive cancer. Infrared imaging could fundamentally change how pathology is done in the clinic because it can measure the chemical changes in cells when disease occurs. If combined with machine learning, infrared imaging could prevent errors, shorten diagnosis time and may even predict disease outcome. Despite this potential, infrared imaging cannot resolve the fine morphological details of cells at the level of optical microscopy. The overarching idea of this project is thus to test if we can improve diagnostic value by using novel infrared nano-imaging methods.

In the first part of this project, the student will compare two established methods for infrared nano-imaging and determine the most promising method. To this end, the student will fabricate test samples and measure them on state-of-the-art microscopes in the nano-optics laboratory. In the second part, the student can image ultrathin sections of biological cells. The aim is to understand the image contrast and to verify that cell morphology is correctly resolved. Basic knowledge on infrared spectroscopy is beneficial; knowledge of Matlab is needed to perform data analysis

We offer an excellent opportunity to work in an international environment and perform leading research in infrared nanoimaging..

The successful **candidate** will have a .
Additionally, the candidate should demonstrate experience in the following skills:

Although not compulsory, the following points will be considered:

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We promote teamwork in a diverse and inclusive environment and welcome all kinds of applicants regardless of age, disability, gender, nationality, race, religion, or sexual orientation.

The position is expected to start in 01/10/2021 and for a total length of up to 10 months (01/10/2021 - 31/07/2022) in the Nanooptics Group. The contract will be funded by the .

Candidates should **apply** by completing the form below and attaching the following documents:

a. A complete CV
b. A cover letter and at least two reference letters grouped in a single PDF file

The **deadline** for applications is **30/06/2021**.

NOTES:
(i) All applicants will receive an answer after the end of the selection process; but please note that due to the large number of submissions that are expected, we cannot provide individual feedback.
(ii) Additional information about nanoGUNE's commitment towards HR excellence in Research and Gender Equality are available on our website.
(iii) We encourage you to subscribe to our HR mailing list to receive information related to nanoGUNE's open positions and open calls for different training and talent attraction programs.