

## Piezoelectric properties and high resolution imaging of DNA crystals

Discover the **NANOMOTION** World as an Early Stage Researcher (PhD student) in a European program on “Nanoelectromechanical Motion in Functional Materials (**NANOMOTION**)”! We invite applications to the interdisciplinary Marie Curie Initial Training Network (ITN) **NANOMOTION** offering positions to 12 Early Stage Researchers (3 year PhD) and one Experienced Researcher (Post-Doc, 2 years).

**The individual project:** “Piezoelectric properties and high resolution imaging of DNA crystals” will be hosted at University College Dublin (Ireland) with secondments to University of Aveiro (Portugal) and University of Leeds (UK). The ITN **NANOMOTION** is a highly interrelated network of groups throughout Europe tackling the challenges in nanomaterial property characterization using scanning probe techniques. Regular workshops and mutual visits make this program highly attractive for young researchers interested in becoming leading edge experts in various Scanning Probe Microscopy methods applied to functional materials.

**Description:** The position is funded by the European Commission in the framework of the FP7 Marie Curie Initial Training Network “**NANOMOTION**”. **NANOMOTION** aims at the development of the next generation of multifunctional materials (piezoelectrics, ferroelectrics, multiferroics, ionic conductors and polar biomaterials) using novel nanoelectromechanical tools: Piezoresponse Force Microscopy (PFM) and Electrochemical Strain Microscopy (ESM) as well as their combination with traditional scanning probe microscopy methods. **NANOMOTION** is intended to train the next generation of scientists, engineers and technologists in the fundamental aspects of nanoelectromechanics and to apply advanced PFM/ESM tools to study a wide range of emergent multifunctional materials.

**Specific project description:** The primary biopolymer of scientific inquiry, as it contains all of the genetic instructions to build a living organism, is deoxyribonucleic acid (DNA). With the recent completion of mapping the human genome, and advances in nanotechnology-based applications of DNA (e.g., DNA origami, scaffolds for complex nanomachinery, etc.), there is renewed interest in nanoscale characterization techniques for imaging, sequencing, manipulating, and measuring electrical, mechanical, and electromechanical properties of DNA. In this project, crystals of DNA will be synthesized, and their local piezoelectric properties will be investigated in University College Dublin (Ireland) and University of Aveiro (Portugal). By application of dc bias, the local structure of DNA will be controlled. The measurements will also be performed as a function of thermal and optical excitations. The ESR will combine these local electromechanical measurements with ultrahigh resolution imaging in liquid environments available on custom built low noise AFMs, allowing the structure of the DNA to be resolved at the sub-molecular level in physiological environments. Structural changes resulting from modification of the surfaces will be studied in detail. The interaction between these potentially piezoelectric crystals and the hydration layers at the DNA-water interface will provide key insight into using the functional properties of such DNA scaffolds.

**Nr. of job position:** ESR12

**Research fields:** Physics, Chemistry, Engineering

**Career stage:** Early Stage Researcher (postgraduate)

**Benefits:** Employment as a PhD student with highly competitive salary (base salary 38 k€/year multiplied by the country correction coefficient, currently 1.147) + mobility allowance + travel allowance + career exploratory allowance). The position entitles participation in international conferences and **NANOMOTION** workshops.

**Application details:** Please, send your application to this project (including motivation letter, CV, copy of University certificates, names of two referees all in ONE pdf or Word document using your name and number of position as filename) to Dr. Brian Rodriguez ([brian.rodriguez@ucd.ie](mailto:brian.rodriguez@ucd.ie)) and to the **NANOMOTION** training manager Prof. Doru Lupascu ([nanomotion.esr12@uni-due.de](mailto:nanomotion.esr12@uni-due.de)). Please use **NANOMOTION** application and number of position ([ESR12](#)) in the email subject line.

For further information, please visit: <http://www.nanofunction.org/brian-rodriguez/>

For other job offers, please visit: [www.ITN-Nanomotion.eu](http://www.ITN-Nanomotion.eu)

**Requirements:**

Degree: Master or equivalent

Degree field: Physics/Chemistry/Engineering

Main research field: Physics/Chemistry/Engineering

Research subfield: Materials Science/Scanning Probe Microscopy

Required Research Experience: Physics/Chemistry/Engineering

Research Sub Field: Experience with organic materials or with scanning probe techniques

Language: English. Language level: Proficiency in spoken and written English

The candidate should have a MSc or equivalent degree in Physics, Chemistry or Materials/Mechanical/Electrical Engineering allowing starting a doctoral fellowship. Profound knowledge of English (both written and spoken) is required. The candidate should have initial knowledge either on materials preparation or on scanning probe microscopy methods. EU imposes strict requirements on eligibility: At the time of recruitment the researcher must not have resided or carried out his/her main activity (work, studies, etc...) in the country of the beneficiary (Ireland) for more than 12 months in the 3 years immediately prior to his/her recruitment under the project. He/she also should have less than 4 years of research experience. This is measured from the date they obtained the degree which formally entitles them to embark on a doctorate, either in the country in which the degree was obtained or in the country in which the research training was provided.

**Timeline:**

The position is opened from January 1<sup>st</sup>, 2012. Applications are considered on a continuous basis until a suitable candidate is identified.



**SEVENTH FRAMEWORK PROGRAMME  
THE PEOPLE PROGRAMME**

**Initial Training Network**

**NANOMOTION**



**NANOELECTROMECHANICAL MOTION IN FUNCTIONAL MATERIALS**