

The EMAT research group at the department of Physics (University of Antwerp) and the STEM group at the department of Materials (University of Oxford) are seeking to fill a

PhD position in the area of dose-efficient fusion of imaging and analytical techniques in scanning transmission electron microscopy under the supervision of Prof Sandra Van Aert (University of Antwerp) and Prof Peter D Nellist (University of Oxford).

The main goal of this project is to realize a major breakthrough in the quantitative analysis of imaging and analytical techniques in scanning transmission electron microscopy (STEM). Therefore, we will exploit the physics-based description of the fundamental processes of electron scattering and combine this with a thorough multivariate statistical analysis of the recorded signals. In this manner, we will be able to identify the chemical nature of all individual atoms in three dimensions. So far, imaging and analytical signals have mostly been analyzed separately in STEM. Although analytical techniques are in principle well suited because of their elemental specificity, they have a much lower signal to noise ratio as compared to imaging techniques. We foresee that our multivariate method, in which new physics-based models are incorporated to describe the electron-object interaction, enables us to achieve element-specific atom counting at a local scale and to determine even the ordering of the atoms along the viewing direction. Furthermore, our approach will be optimized to reach high elemental measurement precision for a minimum incoming electron dose. This novel dose-efficient quantitative methodology will clearly usher electron microscopy in a new era of 3D element-specific metrology at the atomic scale and allow characterisation of beam-sensitive materials. This will exactly provide the input needed to understand the unique link between a material's structure and its properties in both materials and in life sciences.

Job description

- Depending on your interest, the successful candidate will work on (i) the development of a multivariate statistical framework to simultaneously analyze STEM, EELS, and EDX datasets or (ii) the acquisition and quantitative analysis of experimental data;
- You prepare a doctoral thesis in the field of sciences;
- You publish scientific articles related to the research project of the assignment;
- You present your work at national and international workshops and conferences;
- You will be employed at the University of Antwerp and closely interact with the team at the University of Oxford involving frequent research stays in Oxford.

Profile and requirements

- You hold a master degree with a background in e.g. physics, statistics, mathematics, transmission electron microscopy or scientific computing;
- You are enthusiastic and greatly interested in the quantitative analysis of electron microscopy data;
- You can submit outstanding academic results;
- You are highly motivated, quality-oriented, conscientious, creative and cooperative.

We offer

- a doctoral scholarship for a period of 1 year, renewable for 3 years after positive evaluation;
- an exciting project in which we will aim to go significantly beyond the state-of-the-art;
- a competitive salary;
- the position will be filled as soon as possible, but the starting date can be adapted to the selected candidate's availability;
- a world-class, dynamic and stimulating work environment with state-of-the-art instrumentation and computing facilities (see also <http://www.emat.uantwerpen.be/> and <http://www-stemgroup.materials.ox.ac.uk/>).

How to apply

You can submit your motivation letter, CV, summary of your Master thesis, a list and grades of the courses that you took during your studies, and names of 2 professional referees as **one single PDF** file uploaded on the Application Submission page at <http://nano.uantwerpen.be/jobs/submission/>

Additional information about the vacancy can be obtained from:

Sandra Van Aert, tel. +32 3 265 3252, sandra.vanaert@uantwerpen.be

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