EUROPEAN COMMISSION
DIRECTORATE-GENERAL HUMAN RESOURCES AND SECURITY
Directorate HR.AMC – Account Management Centre
**HR.DDG.AMC 8**

| **2018-KRU-G-000-010684** | **Thermal properties investigation at high temperatures of nuclear fuels** |
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| **Position for:**<br><br>Trainee TYPE I | As the science and knowledge service of the Commission, the mission of DG Joint Research Centre is to support EU policies with independent evidence throughout the whole policy cycle.<br><br>The JRC is located in 5 Member States (Belgium, Germany, Italy, the Netherlands and Spain). Further information is available at: http://www.jrc.ec.europa.eu<br><br>**Short description of activity:**<br><br>At JRC-Karlsruhe a new inverse method was developed to investigate thermal properties at very high temperatures (up to the melting point) of nuclear fuels and other materials used in nuclear reactors, and candidate materials for future nuclear plants. The method is based on the laser-flash technique: a specimen is heated at the conditioning temperature by two laser beams, and after reaching a constant temperature an additional pulse is applied at the front face in order to increase slightly the central temperature of the rear side (≈ 10 K). The temperature curve in function of time is compared to the theoretical curve from a finite element model (FEM) describing the experiment. The unknown parameters, thermal conductivity, heat capacity or emissivity are determined by a fitting procedure.<br><br>In this project the trainee will measure thermal properties of different materials actually under study in our labs. (S)he will have the opportunity to work with laser devices, radiation pyrometers, infrared camera and some advanced data acquisition devices and programs.<br><br>An important part of the work is the improvement of the analysis of the results. Firstly, the FEM model should be re-assessed, and key parameters should be better described, such as: laser energy profile, spot size of the pyrometers and their size-of-source effect, heat losses of the specimen and description of the heat flow in the vessel, evaporation/sublimation/surface ablation of the specimen. The FEM model runs on FlexPDE software and should be programmed on the simulation platform Comsol Multiphysics. In a second step, the trainee will improve the Matlab script used for the fitting of the theoretical thermograms to the experimental ones. Finally, the new model will be used to analyse results for different materials actually under study in our labs.<br><br>**Qualifications:**<br>Essential<br>Relevant studies B.Sc. or M.Sc., Knowledge in heat transfer and/or materials science, and finite elements modelling<br><br>Advantage<br>Previous experience in a materials science or chemistry lab, knowledge of ceramic sciences and engineering.<br><br>**For general eligibility requirements, please read the rules governing the traineeship scheme of the JRC:**<br><br>https://ec.europa.eu/jrc/en/working-with-us/jobs/temporary-positions/jrc-trainees |

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| **Directorate**<br>**Unit** | JRC.G, Nuclear Safety and Security (Karlsruhe)<br>JRC.G.I.3, Nuclear Fuel Safety<br><br>Further information:<br>https://ec.europa.eu/jrc/en/about/organisation<br><br>https://ec.europa.eu/jrc/en/science-area/nuclear-safety-and-security |
| **Indicative duration**<br><br>**Preferred starting date** | 5 months<br><br>Early 2019 |
| **JRC Site**<br><br>**Country** | Karlsruhe<br><br>Germany |
| **JRC contact details** | **For any technical problems with your application, please contact:**<br>HR-AMC8-RECRUITMENT-TOOLS-SUPPORT@ec.europa.eu |