

Master thesis proposal

Thin film deposition and conception assisted by AI for corrosion

Keywords : Thin films, artificial intelligence, magnetron sputtering, HiPIMS, corrosion, neural networks, XRD, SEM, spectroscopy

SCIENTIFIC DESCRIPTION :

Data and Materials science convergence paves the way to the discovery acceleration of new materials for great transitions : towards energies always more sustainable, digital applications more frugal and the medicine of the future.

Within the framework of this dynamics organized at the national level by the PEPR DIADEM led by CEA and CNRS, the successful candidate will join the INSTN institute within CEA to take part to the development of thin film coatings. He or She will realize on DIADEM-2D, the new thin film deposition platform of INSTN using PVD HiPIMS, the development of new coatings for corrosion in nuclear environments applications.

The successful candidate will characterize its samples *in situ* by Optical Emission Spectroscopy (OES), then *ex situ* structurally (XRD, SEM, ...) and chemically (EDS, XRF, ...). Finally, He or She will determine their resistance to corrosion in collaboration with a partner laboratory located on CEA-Saclay center (DES/ISAS/DRMP/S2CM).

He or She will use his/her results in the scope of a collaboration with CEA-LIST for the development of ExpressIF Materials, a symbolic AI tool dedicated to Materials Science research aiming to improve the chemical composition and physical properties of the system of interest.

This internship may be continued in a PhD thesis with an application to the international doctoral program of PEPR DIADEM (<https://www.pepr-diadem.fr/training/the-international-doctoral-and-post-doctoral-program/>)

Techniques/methods in use : Magnetron sputtering, HiPIMS, XRD, OES, SEM, EDS, XPS, ICP, electrical resistivity, synchrotron (surface XRD, XPS, Raman)

Budget description and use : 5000€ for 4-5 months of internship grant based on CEA salary grid

Applicant skills : Physics and chemistry of condensed matter, python, taste for experiments

Industrial partnership : No

Internship supervisor(s) : Paul Foulquier, +33 1 69 08 20 05, paul.foulquier@cea.fr

Internship location : INSTN, CEA-Saclay, 91191 Gif-sur-Yvette Cedex, France

Possibility for a Doctoral thesis : Yes

