



PhD in SCIENZE E TECNOLOGIE ENERGETICHE E NUCLEARI / ENERGY AND NUCLEAR SCIENCE AND TECHNOLOGY - 40th cycle

PNRR 630 Research Field: ADVANCED CHARACTERIZATION OF PROTECTIVE COATINGS FOR LIQUID METAL COOLED NUCLEAR REACTORS

Monthly net income of PhDscholarship (max 36 months)
€ 1500.0
In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
<p>Motivation and objectives of the research in this field</p>	<p>With reference to lead fast reactors (LFRs), surface coating technology candidates as one of the most promising strategies to design and produce advanced materials able to mitigate corrosion phenomena induced by heavy liquid metal coolants. In this framework, the precise analysis of the as-deposited coating characteristics and their evolution after experiments relevant for the study coatings functionality (e.g., corrosion or irradiation tests) emerge as key steps to engineer novel materials. Through an experimental approach the PhD project aims to produce coatings for cladding corrosion protection and to qualify them in terms of crucial properties (e.g., morphology, microstructure, stress state or adhesion). More specifically, the considered aspects will be: (i) deposition of coatings tailored at the nanoscale, study of the as-deposited characteristics and correlation with process parameters; (ii) Analysis of the functional properties of the as-deposited coatings; (iii) evaluation of the coatings behaviour after the interaction with relevant environments (e.g., radiation fields or liquid metals, respectively).</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<p>The research activity aims to investigate protective coatings developed for LFRs reactors and deposited by magnetron sputtering and other techniques. In this</p>



	<p>respect, a specific focus will be devoted to the analysis of the coatings in terms of their morphological, structural and mechanical properties by exploiting different characterization methods (e.g., SEM, EDXS, XRD, vibrational spectroscopies, nanoindentation, nanoscratching) in dedicated facilities in collaboration with national and international partners. In addition to pristine samples, coatings tested in corrosion or irradiation experiments will be analyzed to obtain information to further improve coatings design and development.</p>
Educational objectives	<p>Education of people to be launched in the world of research and high technology industry in the fields of physics and engineering of materials, able to manage interdisciplinary issues, perform and interpret complex experiments and produce new equipment.</p>
Job opportunities	<p>Private and public R&D. Highly qualified positions in a wide range of industries related for example with production, development, and use of advanced materials. The present research will be performed in collaboration with national and international partners.</p>
Composition of the research group	<p>3 Full Professors 4 Associated Professors 1 Assistant Professors 15 PhD Students</p>
Name of the research directors	<p>Matteo Passoni</p>

Contacts

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Additional support - Financial aid per PhD student per year (gross amount)

Housing - Foreign Students

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Housing - Out-of-town residents (more than 80Km out of Milano)	--
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Scholarship Increase for a period abroad	
Amount monthly	750.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	newcleo Srl
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	to be defined
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p>Educational activities: Financial aid per PhD student is available for purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences, instrumentations and computer, etc. This amount is equal to 10% of the annual gross amount, for 3 years.</p> <p>Teaching assistantship: Availability of funding in recognition of supporting teaching activities by the PhD student. There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.</p> <p>Computer availability: individual use. Desk availability: individual use.</p>