






MATERIALS SCIENCE AND TECHNOLOGY	
CYCLE	XXXVIII
COORDINATOR	Prof. Enrico DALCANALE email: enrico.dalcanale@unipr.it Department of Chemistry, Life Sciences and Environmental Sustainability
DURATION	3 years
STARTING DATE OF THE PHD PROGRAM	01/11/2022
PARTNER INSTITUTION	The Italian National Research Council (C.N.R.)
RESEARCH TOPICS (The candidate MUST mandatorily indicate one research topic in the form ANNEX A)	
<ul style="list-style-type: none">• Photovoltaic devices• Functional materials• Nanodiagnostics• Nanostructured materials• Supramolecular sensors and devices• Semiconductive massive crystals• Low dimensionality semiconductive structures• Self-healing and self-diagnostic polymers• Ceramic and composite materials• Magnetic materials and magneto-refrigeration	
TRAINING OBJECTIVES	
The PhD program in Materials Science aims at the preparation of PhDs equipped with strong scientific background and wide research experience in materials science. Enrollment is open to MS laureates in Materials Science, Chemistry, Physics, Industrial Chemistry, Engineering and Biological Sciences. The Board provides a wide range of courses and seminars in different scientific areas, with particular focus on all aspects of materials science (synthesis, characterization, functions and devices). It also offers soft skills courses. The PhD program offers an interdisciplinary preparation through research activity, also in collaboration with foreign Institutions.	
ADMISSION REQUIREMENTS	Regardless of age and citizenship, applicants holding at least one of the following academic qualifications can apply for admission: <ul style="list-style-type: none">– Laurea specialistica or Laurea magistrale (second cycle master's degree)– Laurea Vecchio Ordinamento (degree obtained under the previous Italian regulations);– Second cycle Master's degree obtained abroad, equivalent to the above mentioned Italian degrees and recognized as suitable for the admission to doctoral program Undergraduates can also apply for admission to the selection, with the obligation to obtain the degree within the deadline set for enrollment, that is by 24.10.2022

POSITIONS PUT OUT TO COMPETITION	20	With Scholarship	20
Position with Scholarship			
N°	Funding entity		Research Topic
2	Scholarship funded by University of Parma (Ministerial funds)		<ul style="list-style-type: none">• Design of programmable systems based on synthetic DNA as functional material for the development of nanodevices for precision biomedical applications.



		<ul style="list-style-type: none"> • Low loss and low cost hybrid type heterojunctions for power electronics: synthesis of new materials and devices.
2	Scholarship funded by The Italian National Research Council C.N.R. - ISTEC	<ul style="list-style-type: none"> • <i>Circular economy in the ceramic tile production: resource efficiency and waste valorization.</i> • Developments of innovative materials for carbon dioxide and nitrogen oxides conversion into valuable products by photo-electrochemical cells.
1	Scholarship funded by The Italian National Research Council C.N.R. - IMEM	<ul style="list-style-type: none"> • CVD/printing growth of 2D dichalcogenides for nanoelectronic devices
Position with Scholarship LINKED TO SPECIFIC TOPICS (art. 11 of the Competition notice)		
<p>During the Oral Exam, applicants may express and/or confirm their interest of being assigned a scholarship linked to a specific research topic. The Examination Board will evaluate their eligibility based on specific competences, experience and specific aptitudes of the applicants.</p>		
N°	Funding entity	BOUND RESEARCH TOPIC
1	Scholarship partly financed with UNIVERSITY funds and co-financed by The Italian National Research Council C.N.R. - IMEM	<ul style="list-style-type: none"> • Development of a new type of permanent magnet with low rare earth content obtained from the recovery of recycled magnets.
2	Scholarship partly financed with UNIVERSITY funds and co-financed by The Italian National Research Council C.N.R. - ISTEC	<ul style="list-style-type: none"> • Development of innovative materials and components for proton conduction solid oxide cells also operating in reversible mode (RSOC) • Safe-and-Sustainable-by-Design applied to nano-production. Engineering of nano-phases and products for environmental protection. Evaluation of performance, safety and sustainability attributes through their life cycle to identify the best design options.
1	Scholarship financed with funds under the PNRR– Mission 4 component 1 (Ministerial Decree 351/2022 art. 7 “PNRR Research”) 	<ul style="list-style-type: none"> • Innovative magnetic materials for the recovery of waste heat at low temperatures through the technology of thermomagnetic energy generation, to improve efficiency and sustainability of production processes.
1	Scholarship co-financed with funds under the PNRR - Mission 4 component 2 (Ministerial Decree 352/2022) and co-financed by the Company EPTAINKS S.p.A. 	<ul style="list-style-type: none"> • New formulations of sustainable magnetic inks with multifunctional properties.
1	Scholarship co-financed with funds under the PNRR - Mission 4 component 2 (Ministerial Decree 352/2022) and co-financed by the Company Dallara S.p.A. 	<ul style="list-style-type: none"> • New reprocessable epoxy resin-carbon fiber (CFRP) composites based on phenoxy resin vitrimers. Replacement of bisphenol A with bio-based building blocks in CFRPs



1	<p>Scholarship co-financed with funds under the PNRR - Mission 4 component 2 (Ministerial Decree 352/2022) and co-financed by the Company Vettriceramici S.r.l.</p> 	<ul style="list-style-type: none"> • New whitening materials for engobes and ceramic bodies: design, synthesis and characterization of reactive components to increase the whiteness of ceramic products.
1	<p>Scholarship co-financed with funds under the PNRR - Mission 4 component 2 (Ministerial Decree 352/2022) and co-financed by the Company Curti - Costruzioni Meccaniche S.r.l.</p> 	<ul style="list-style-type: none"> • Green refractory ceramic matrix composites reinforced with recycled carbon fibers as a secondary raw material in the circular economy.
1	<p>Scholarship co-financed with funds under the PNRR - Mission 4 component 2 (Ministerial Decree 352/2022) and co-financed by the Company Lamberti S.p.A.</p> 	<ul style="list-style-type: none"> • Innovative ceramic materials based on calcium phosphate for applications in the environmental field.
1	<p>Scholarship co-financed with funds under the PNRR - Mission 4 component 2 (Ministerial Decree 352/2022) and co-financed by the Company Industrie Bitossi S.p.A.</p> 	<ul style="list-style-type: none"> • in ambienti severi. • High efficiency sintering of SiC, B4C and similar non-oxidic ceramics for applications in harsh environments.
1	<p>Scholarship co-financed with funds under the PNRR - Mission 4 component 2 (Ministerial Decree 352/2022) and co-financed by the Company Kemin Cavriago S.r.l.</p> 	<ul style="list-style-type: none"> • Innovative sensors for non-destructive and on-line food control systems.
1	<p>Scholarship co-financed with funds under the PNRR - Mission 4 component 2 (Ministerial Decree 352/2022) and co-financed by the Company due2lab S.r.l.</p> 	<ul style="list-style-type: none"> • AI algorithms for the interpretation of data generated by X-ray detectors for aerospace dosimetry, nuclear protection and for the recognition of materials linked to the recycling of raw materials.
1	<p>Scholarship co-financed with funds under the PNRR - Mission 4 component 2 (Ministerial Decree 352/2022) and co-financed by the Company Davines S.p.A.</p> 	<ul style="list-style-type: none"> • Development and validation of analytical methods for studying the fungal degradation of raw materials of cosmetic interest and obtaining packaging.
2	<p>Scholarship co-financed with funds under the PNRR - Mission 4 component 2 (Ministerial Decree 352/2022) and co-financed by the Company Intercos S.p.A.</p> 	<ul style="list-style-type: none"> • Eco-sustainable and/or circular economy materials for the industrialization of the cosmetic product. • Eco-sustainable materials for the final cosmetic packaging.



ADMISSION PROCEDURES		Assessment of QUALIFICATIONS: up to 60 points (a minimum score of 30 points shall be required to be admitted to the Oral Exam) ORAL EXAM: up to 60 points Minimum score for ELIGIBILITY: 70/120
Foreign Language	Language the fluency of which shall be assessed during the Oral Exam: ENGLISH . The evaluation of the knowledge of this language will be oral and will consist in translating of a scientific text.	
CANDIDATES ADMITTED TO THE ORAL EXAM CAN TAKE IT EITHER IN PRESENCE OR REMOTELY IN AUDIO AND VIDEO TELECONFERENCE		
(Applicants who intend to take the Oral Exam remotely must submit a formal request, using the form attached to the competition notice)		
THE INTERVIEW MAY BE HELD ALSO IN ENGLISH		
LIST OF QUALIFICATIONS TO BE SUBMITTED AND THEIR ASSESSMENT		
MANDATORY DOCUMENTS TO BE ATTACHED TO THE ON-LINE APPLICATION		
ANNEX A	(art. 5 of the Competition notice)	
Identification Document	Scanned Copy of a valid identity document with photo (i.e. identity card, passport)	
Curriculum Vitae et studiorum	No specific CV format is required (see art. 4 of the Competition notice)	
Abstract of degree thesis	Abstract of the second cycle master's degree thesis. Undergraduate applicants must submit the draft of the thesis approved by their supervisor (abstract/draft of the thesis: 10.000 characters including spaces)	
Qualifications	Certificates and academic transcript of records for both Bachelor' and Master' degrees containing the following details for each degree held: (art. 4 of the Competition notice): University that granted the degree - Type of degree (first cycle/second cycle/single cycle) Name of the degree program - Date of graduation - Final mark - List of exams and corresponding scores (academic transcript of records) - Translation into Italian or English (only for degrees issued in languages other than Italian or English).	
FURTHER QUALIFICATIONS THAT MAY BE ATTACHED TO THE APPLICATION, IF IN POSSESSION OF THE APPLICANT (only qualifications attested by a document drawn up in Italian or in English)		
Statement of Research interest	Short text – maximum 2 pages – in Italian or in English, aimed at explaining the candidate's reasons to attend the PhD program and at describing her/his specific research interests	
Scientific Publications	Articles and/or reviews in scientific journals with peer reviewing, abstracts of papers or posters presented at conventions or meetings	
Final mark of graduation		
Average of the exam marks	(for candidates enrolled under conditions and who graduate by 24.10.2022)	
EVALUATION CRITERIA		
QUALIFICATION	EVALUTATION CRITERIA	POINTS
Curriculum Vitae et studiorum	Including academic career and postgraduate experience, accompanied by a statutory declaration in lieu of the certification of the exams passed with the relevant marks, as well as the final graduation mark.	Up to 20 points



Graduation mark	Score related to the final mark: - 110 with honors (magna cum laude): 20 points - 110: 16 points - From 105 to 109: 12 points - From 100 to 104: 8 points - From 95 to 99: 4 points - Under 95: 0 points	Up to 20 points
Average of the exam marks (if the candidate will attain the degree no later than 31 October 2021)	Score related to the average of the exam marks: - 30/30: 20 points - From 28/30 to 29/30: 16 points - From 26/30 to 27/30: 12 points - 25/30: 8 points - 24/30: 4 points - Under 24/30: 0 points	Up to 20 points
Graduation thesis	Consistency of the Master's Degree thesis with the doctoral program research topics (briefly describe the topics in the curriculum vitae)	Up to 10 points
Statement of Research Interest	Short text – maximum 2 pages – in Italian or in English, aimed at explaining the candidate's reasons to attend the PhD and at describing the specific research interests	Up to 5 points
Scientific publications	Articles and/or reviews in scientific journals with peer reviewing, abstracts of papers or posters presented at conventions or meetings	Up to 5 points
ORAL EXAM	EVALUATION CRITERIA	POINTS
The ORAL EXAM will focus on the candidate's motivation to attend the PhD, on the description of his specific research interests and on a discussion of the qualifications presented by the candidate.	<ul style="list-style-type: none"> ○ knowledge of foreign languages: 10 points ○ general knowledge of issue connected to the Master's thesis: 25 points ○ general knowledge of issues connected to the PhD course: 25 points 	Up to 60 points
SCHEDULE OF THE ADMISSION EXAMS		
ORAL EXAM	DATE	20 September 2022 (with possible extension to 21 September 2022)
	TIME	09:00 AM (Italian Time)
	PLACE	Department of Chemistry, Life Sciences and Environmental Sustainability CHEMISTRY BUILDING Parco Area delle Scienze, 17/A – Campus 43124 PARMA - ITALY
OTHER INFORMATION	For foreign candidates, the admission examinations may be held in English at the candidate's choice.	