

<https://stm.uniroma3.it/job/phd-nanoscale-3d-printing/>

PhD Position with Scholarship – Nano-/Micro-Mechanical Characterisation and 3D Microfabrication of Architected Materials

Description

We are offering a three-year PhD scholarship for a candidate interested in developing an experimental research profile at the interface between high-resolution 3D microfabrication, ceramic architected materials, coating/interface engineering, and nano-/micro-mechanical testing.

The project will investigate how architecture, processing route, and surface/interface engineering control the mechanical response of nano- and micro-architected materials. High-resolution 3D polymeric lattices produced by two-photon lithography will be converted into ceramic architectures through controlled pyrolysis or related routes and used as platforms for conformal thin film coatings.

The candidate will optimise selected fabrication and conversion parameters, characterise geometry and defects, and measure mechanical response using nanoindentation and micro-mechanical testing methods. Depending on sample maturity, the work may include in-situ SEM/FIB testing, single-truss loading, pillar splitting, and FIB-DIC-based residual stress analysis.

The activity will be carried out in close interaction with the teams working on ALD deposition and mechanical modelling, integrating experimental results with film design, interface engineering, and simulations.

Responsibilities

- Contribute to the design and experimental study of nano- and micro-architected materials produced by high-resolution additive manufacturing.
- Work on 3D polymeric lattice structures produced by two-photon lithography through the project platform and collaborating teams.
- Study ceramic conversion routes based on controlled pyrolysis or related processes.
- Characterise geometry, defects, surfaces, coatings, and interfaces using microscopy and surface-analysis methods.
- Perform nano-/micro-mechanical testing, including advanced nanoindentation and selected small-scale mechanical tests.
- Develop experience with in-situ SEM/FIB mechanical testing, FIB-based sample preparation, pillar splitting, and FIB-DIC residual stress analysis where appropriate.
- Integrate experimental results with coating design and mechanical modelling activities within the SunRise FIS 2023 Project.
- Analyse experimental data quantitatively and contribute to structure-processing-property correlations in architected materials.

Essential requirements

- Master's degree, or equivalent qualification, in Materials Science/Engineering, Mechanical Engineering, Civil Engineering in relevant

Hiring organization

Università degli Studi Roma Tre

Employment Type

Full-time

Beginning of employment

November 2026

Duration of employment

three years

Job Location

Via Vito Volterra, 62, 00146, Rome, Latium, Italy

Base Salary

€ 1200 - € 1600

Date posted

12 Maggio 2026

Valid through

04.07.2026

structural/materials/mechanics areas, Aerospace Engineering, Physics, Nanotechnology, or related fields.

- Solid background in materials science, mechanics of materials, solid mechanics, fracture mechanics, surface engineering, or microstructural characterisation.
- Strong motivation for experimental research on advanced materials, architected structures, coatings, and small-scale mechanical testing.
- Basic laboratory experience in at least one relevant area: materials processing, microscopy, mechanical testing, surface/coating characterisation, additive manufacturing, or microfabrication.
- Ability to analyse experimental data critically and quantitatively.
- Basic data-analysis skills using tools such as Python, MATLAB, Origin, Excel, ImageJ/Fiji, or similar software.
- Willingness to work hands-on with advanced instrumentation and to follow rigorous experimental protocols.
- Ability to work in an interdisciplinary environment involving fabrication, characterisation, coating deposition, and modelling.
- Good written and oral communication skills in English.

Qualifications

- Familiarity with two-photon lithography, micro/nano-3D printing, laser-based microfabrication, or other high-resolution additive manufacturing methods.
- Previous exposure to polymer-derived ceramics, pyrolysis, ceramic processing, or thermal treatment of materials.
- Basic experience with nanoindentation, micro-compression, micro-bending, scratch testing, pillar splitting, or other small-scale mechanical testing methods.
- Familiarity with SEM, FIB, EDS, TEM, AFM, optical profilometry, or quantitative microscopy.
- Interest in in-situ SEM/FIB mechanical testing and FIB-based sample preparation.
- Interest in residual stress analysis, including FIB-DIC or other micro-scale stress-relief approaches.
- Previous exposure to coatings, thin films, ALD, PVD, surface engineering, or interface mechanics.
- Interest in architected materials, mechanical metamaterials, cellular solids, size effects, and structure–property relationships.
- Basic familiarity with finite element modelling or willingness to interact with modelling teams.

Job Benefits

This is a full-time, three-year PhD position funded by a scholarship within the SunRise FIS 2023 Project.

The successful candidate will receive structured hands-on training in high-resolution 3D microfabrication, ceramic conversion, advanced nano-/micro-mechanical testing, microscopy, and interface engineering of architected materials.

This PhD is particularly suited to candidates who want to build an experimental profile at the frontier of microfabrication, advanced characterisation, coatings, and small-scale mechanics. By the end of the project, the candidate is expected to have developed a rare combination of skills in architected materials, coating/interface mechanics, quantitative microscopy, and nano-/micro-mechanical testing, with relevance to both academic research and high-technology sectors.