

MecaNano: a European network gathering the micromechanics community to tackle challenges of small-scale mechanical behavior – An example through nanolaminates thin films

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Our society urgently needs new materials with improved performance and durability in order to overcome its environmental crisis. Room for significant progress is available at the nano-scale, where all properties originate. Research at this length scale has strongly intensified over the past two decades, but the knowledge remains very fragmented, so that a holistic understanding of how the nanoscale mechanical behavior gives rise to the macroscopic properties of the materials is still missing.

A global overview of the MecaNano COST Action objectives will be provided. Among others, MecaNano ambitions to combine the expertise and resources of European and associated researchers to overcome the different bottlenecks limiting the exploration of mechanical size effects. Synergetic gains will be achieved through a common agreement on the physical parameters to be investigated and by promoting interoperability of the research data. In addition, the experimental yield will be boosted by easing access to the latest techniques in nanomechanical testing, nanomechanical simulation and nanocharacterization to the whole community. Even more dramatic gains will be achieved by promoting the application of machine learning to nanomechanical research and favoring the development of interdisciplinary in situ techniques.

As a practical example showing the importance to understand the small-scale behavior of materials, the mechanical properties and deformation mechanisms of nanolaminates thin films will be presented. Nanolaminates films present a promising strength and toughness balance thanks to their alternance of amorphous/crystalline structure. This opens up new routes for improving the durability of devices through the use of performant protective coatings.

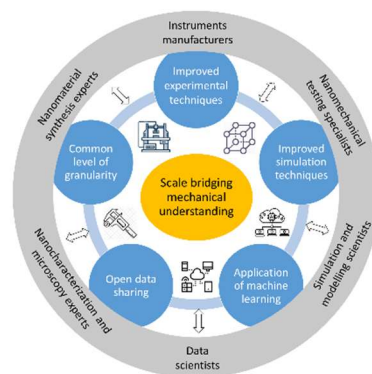


Figure 1. Interconnection of the MecaNano Action.