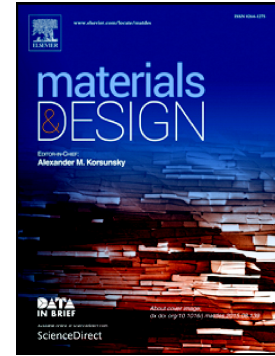


Accepted Manuscript

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PII: S0264-1275(17)30962-0
DOI: doi:[10.1016/j.matdes.2017.10.035](https://doi.org/10.1016/j.matdes.2017.10.035)
Reference: JMADE 3433
To appear in: *Materials & Design*
Received date: 16 June 2017
Revised date: 28 September 2017
Accepted date: 12 October 2017

Please cite this article as: E.P. Koumoulos, S.A.M. Tofail, C. Silien, D. De Felicis, R. Moscatelli, D.A. Dragatogiannis, E. Bemporad, M. Sebastiani, C.A. Charitidis, Metrology and nano-mechanical tests for nano-manufacturing and nano-bio interface: Challenges & future perspectives. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. *Jmade*(2017), doi:[10.1016/j.matdes.2017.10.035](https://doi.org/10.1016/j.matdes.2017.10.035)

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Metrology and nano-mechanical tests for Nano-Manufacturing and Nano-Bio Interface: Challenges & Future Perspectives

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ABSTRACT

Nanometrology refers to measurement techniques that assess materials properties at the nanoscale. Laboratory-based characterization of nanomaterials has been the key enabler in the growth of nanotechnology and nano-enabled products. Due to the small size involved, dimensional measurements has dominated such characterization underpinned by a tremendous development in stand-alone electron/ion microscopes and scanning probe microscopes.

However, the scope of nanometrology extends far beyond off-site, laboratory-based measurements of dimensions only, and is expected to have a tremendous **impact on design** of nano-enabled materials and devices.

In this article, we discuss some of the available techniques for laboratory-based characterization of mechanical and interfacial properties for nanometrology. We also provide a deep insight into the emerging techniques in measuring these properties, keeping in view the need in advanced manufacturing and nanobio-interactions to develop multifunctional instrumentation, traceable and standardized methods, and modelling tools for unambiguous data interpretation.

We also discuss the evaluation of nanomechanical properties and surface/interface response of materials, within the purview of manufacturing processes and standardization.

Finally, we discuss scientific and technological challenges that are required to move towards real-time nano-characterisation for rapid, reliable, repeatable and predictive metrology to underpin upscaling nanomaterials and nano-enabled products from the research field to industry and market.

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