

Structural and Morphological X-ray Studies of Inorganic Nanomaterials

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In order to structurally and morphologically characterize novel materials, X-ray based techniques such as X-ray Diffraction – XRD, Small/Wide Angle X-ray Scattering - SAXS/WAXS, including the grazing incidence (GI) version - GISAXS/GIWAXS and Pair Distribution Function - PDF are typically used. The choice of the proper technique depends – as first - on the state of the materials, as they can be produced in powders (suitable for XRD and PDF), embedded in films and free-standing membranes (convenient for SAXS/WAXS), anchored on top of surfaces (proper for GISAXS/GIWAXS) or dispersed in liquids (to analyze via SAXS/WAXS). Additionally, micro and nano X-ray beams can be adopted to eventually explore the lateral heterogeneity of the materials or to map area of interest. As ultimate possibility coherent X-ray beams can be used.

An overview of the possibilities available in this field will be given [1,2,3,4], selecting specific examples of inorganic nanomaterials studied for different applications.

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[3] Mino, L., Borfecchia, E., Segura-Ruiz, J., Giannini, C., Martinez-Criado, G., and Lamberti, C. Materials characterization by synchrotron x-ray microprobes and nanoprobe, (2018) *Rev. Mod. Phys.* 90, 025007

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