

EUROMAT 2021

EUROPEAN CONGRESS AND EXHIBITION
ON ADVANCED MATERIALS AND PROCESSES

WWW.EUROMAT2021.FEMS.EU

12. - 16. SEPTEMBER 2021

GRAZ, AUSTRIA

ASMET
THE AUSTRIAN SOCIETY FOR
METALLURGY AND MATERIALS

FEMS 30
FEDERATION OF EUROPEAN
MATERIALS SOCIETIES
1987 - 2017
www.FEMS.org

Area D: Characterization and Modelling

Symposium D4:

Title: Characterization of 1D and 2D materials

Organizer	Institution	Contact email
Costas Charitidis	National Technical University of Athens, Greece	charitidis@chemeng.ntua.gr

Abstract

Currently studied 1D/2D materials including nanotubes, nanowires, nanorods, graphene family materials, as well as transition metal dichalcogenides (TMDs), transitional metal carbides and carbonitrides (MXenes) are of great interest because of their unique electrical, optical and mechanical properties. The synthetic route of nanomaterials often determines the shape and size of the nanostructures, consequently the properties of those materials are affected. Because of the need of manufacturing and scale up production of nanomaterials, the development of **in-situ characterization techniques** for 1D/2D materials is essential, in order to provide direct feedback for process control especially during material growth. The fabrication of hybrid nanomaterials consisting of 1D and 2D heterostructures has led to the development of novel applications such as Circuits transistors, Optoelectronic Devices, Memory Devices, Sensors, Energy Harvesting and Storage Devices. While structural characterization is important, 1D/ 2D heterostructures exhibit a large number of novel properties such as magnetism, piezoelectrical properties, electrical transport properties and thermal conduction. As a result, the **challenges in characterization of 1D/2D heterostructures** should be addressed. New methods and modifications of conventional characterization techniques are required for the determination of the engineered nanomaterials' properties. Moreover, the choice of the most appropriate characterization method may be limited and therefore combinatorial characterization approach is needed. Thus, the establishment of **methodologies for characterization** (e.g. standard operation procedures) of manufactured nanomaterials as well as the harmonization of characterization data is more than ever desirable. Furthermore, given the constantly rise of demand in nanomaterials and their use in a wide range of applications, attention should be paid to the **importance of characterization in assessing the environmental, health and safety aspects of nanomaterials**.