

**33<sup>rd</sup> Symposium on Thermal Analysis and  
Calorimetry**

**"Eugen Segal"**

**of the**

**Commission for Thermal Analysis and Calorimetry  
of the Romanian Academy**

**BOOK of ABSTRACT**

**CATCAR33**

***17-18 of October 2024, Timișoara – Romania***  
**West University of Timisoara, ICAM**

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## THERMAL CHARACTERIZATION OF COMPOSITE MATERIALS FOR 3D PRINTING

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Polymer was the defining material of the twentieth century whilst, both for the considerable increase in articles published in literature and for the growth of applications over the last fifteen years the defining material platform of the twenty-first century could very well be the hybrid material. The design of an hybrid material is related with the combination of two or more components in a single material to give new and previously unattainable combinations of useful properties [1].

Among the different techniques available, thermal analysis offers, in addition to high accuracy in the measurement, smartness of execution, allowing to obtain with a very limited quantity of material precious information regarding the property–structure correlation, essential not only in the production process, but overall, in the design one. Thus, techniques such as differential scanning calorimetry (DSC), differential thermal analysis (DTA), dynamic mechanical analysis (DMA) and thermogravimetric analysis (TGA) can be used in the design, preparation and characterization of these materials.

Furthermore, since the public pressure about the problems derived from the environmental issues increasingly pushes the research areas, of both industrial and academic sectors, to design material architectures with more and more foundations and reinforcements derived from renewable sources. In these efforts, researchers make extensive and profound use of thermal analysis to this transition from fossil feedstock to renewable ones, and in the development on new manufacturing processes such as those of additive manufacturing (AM).

AM is increasingly in industry with a worldwide market, for AM products and services, estimated to grow to over \$5 billion by 2020 [2]. AM is accepted not for prototyping only but for functional parts too [3], and the filament based technology referred as the Fused Deposition Modelling (FDM) is one the most widely used. Thermal analysis can be used to study the behavior of polymer melts, and not only, during FDM processing to rationalize its effect on printing quality.

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