

High-Power Laser Interaction with Low-Z Porous Materials

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Abstract

Porous materials, or foams, are characterized by a peculiar internal structure constituted by solid filaments or membranes separated by large empty spaces. Since the average density of these materials can be even 500 times lower than the density of the solid parts, a laser beam interacting with the sample is interacting with an almost empty space. Nevertheless, the generation of the plasma from the action of a high-power laser on these materials has many unique features, that opened a large number of applications from inertial confinement fusion [1,2], to particle acceleration [3], to the generation of X-rays [4] or neutrons [5]. The purpose of this contribution is to give an introduction to the current understanding of the fundamental phenomena at play during the interaction and the actual progress in the modeling and experimentation with these materials. Attention will also be given to the current production methods, including the emerging 3D printing technologies, which will open new possibilities in the years to come.

References

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