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Opto-acousto-optic evaluation of the physical properties of nanoporous materials

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The porous materials with the characteristic dimensions of the pores from few nanometers up to a few hundred of nanometers find applications in microelectronic industry (as low-k materials), in photovoltaics and for developing of effective chemical sensors. When the pores are ordered in a spatially periodic structure, these systems present photonic and/or phononic properties which are of a prime interest in applied optics and telecommunication (light and/or phonons spectrum control). Here we report how the methods of picosecond laser ultrasonics based on the generation and detection by lasers of the acoustic waves with frequencies in the band of 10 GHz - 1 THz (with the lengths of hundreds of nanometers down to few nanometers) are applied for the evaluation of the mechanical and optical properties of these materials.