Phototacoustic and Photothermal Phenomena in Complex Porous Media

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Nowadays, porous materials are indispensable for their practical application in sensorics devices and specified chemical reactors. Moreover, the porous semiconductors are perspective as active elements of optoelectronics devices and efficient photoelectrical convertors. It is clear that thermal, transport and mechanical properties of porous media play a crucial role for ensuring reliability of such devices. Porous materials characterize by an important specific surface and complex fractal-like morphology, thus such materials study require some features. Photothermal and photoacoustic techniques are especially useful methods for porous media investigation, because the excitation of informative response in this case is noncontact. In this paper, we overview peculiarities of such methods application for porous materials study. As model samples the widely used porous silicon based structures were chosen. The photoacoustic signal formation in such inhomogeneous media in the cases of most convenient gas-microphone and piezoelectric methods was analyzed as in frequency- as in time-domain. The main emphasizes on the resolving of inverse problems for evaluation of thermal and mechanical parameters were made.