

Temperature Determination During Flash Lamp Annealing

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Abstract

Flash lamp annealing (FLA) is a modern technology for the thermal treatment of materials which currently opens up new application areas. During FLA, an intense pulse of light with a pulse duration of milliseconds and below is applied to the surface of a material. In contrast to traditional methods like furnace annealing, temperature now strongly depends on the material properties and the thickness of the sample. In addition, the short time scale leads to a temperature distribution over depth and makes direct temperature measurements very challenging.

In this work we first review in brief the existing possibilities for a direct temperature measurement during FLA. The main part presents our own concept which is a combination of direct measurements, calibration and thermodynamic simulation. The latter point is of special interest as it allows to get information about the temperature distribution within the material, provided that the relevant material parameters are known. Finally, the impact of such temperature distributions on physical processes like diffusion, crystallization and phase formation is discussed.

Keywords ¹

Flash Lamp Annealing, Temperature Distribution, Millisecond Thermal Treatment, Thermodynamic Simulation, Diffusion, Crystallization, Phase Formation