

HOMOGENEITY STUDY OF A POLYCRYSTALLINE SILICONE LAYER FORMED ON A FLEXIBLE POLYMER SUBSTRATE BY THE LASER-STIMULATED METAL-INDUCED CRYSTALLIZATION

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In this work we study the homogeneity of polycrystalline silicon formed by the laser-stimulated metal-induced crystallization (LSMIC) on a polyimide substrate. The main feature of the LSMIC is using of the infrared laser irradiation to minimize damage to the polymer substrate, which is almost transparent in IR range. Since silicon also practically do not absorbs IR radiation, aluminium absorbing layer was deposited on the top of the structure. During laser irradiation aluminium facilitated silicon crystallization due to metal-induced mechanism and ablated by the laser irradiation. Samples were processed at varying scanning speeds of the laser beam which lead to irradiation with different fluence.

Raman microscopy was used to study the crystal structure of the obtained samples. Detailed maps of the laser-processed samples were obtained using this method. With the help of these maps, the reasons for the lack of crystallization in some samples could be determined. At high fluence values aluminum and silicon were completely ablated by the laser irradiation and carbon layer was formed on polyimide substrate. At optimal fluence values, silicon crystallized completely with high degree of homogeneity and its Raman spectra were almost similar to those of single-crystal silicon. At low fluence values, large areas of aluminum remained on the sample. This sample was characterized by the presence of both an amorphous and a microcrystalline silicon component.

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