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Optimization of the Growth Conditions of a Nd:YVO4 Cylindrical Bar

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The main purpose of this paper is to find those values of the growth process parameters (pulling rate v, temperature at the meniscus basis T0, die radius r0) which assure the growth of a Nd:YVO4 cylindrical bar with a prescribed diameter and for which the non-uniformities of the surface of the bar, due to small uncontrollable oscillations of the pulling rate and the melt temperature at the meniscus basis, are minimum possible. Numerical results are given for a Nd:YVO4 cylindrical bar of 5 [mm] diameter, grown in a furnace in which the vertical temperature gradient is k=33 (K/mm) for the following three types of uncontrollable oscillations: $\Delta v = 0.001$ (mm/s), $\Delta T = 1$ (K); $\Delta v = 0.01$ (mm/s), $\Delta T = 10$ (K) and $\Delta v = 0.02$‘(mm/s), $\Delta T = 20$‘(K), respectively.

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