OAK RIDGE NATIONAL LABORATORY
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Method of Making Textured and Large Single Crystal Materials at High Cooling Rates

Disclosure Number

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Technology Summary

The present invention comprises a unique processing method that yields large single crystals and/or near perfect texturing between crystals. Conventional methods of producing single crystals require slow solidification rates and very specific thermal gradients. Such energy-intensive processes result in very high manufacturing costs for single crystal or directionally solidified components. For example, a single 5-inch semiconductor grade Si wafer can cost thousands of dollars and a single crystal turbine blade can cost upwards of $10K per blade. Almost all the cost associated with such components is linked to processing time and the energy associated with manufacturing. The present invention has been tested and has to produced large single crystals at cooling rates ranging from 30°C/min up to 400°C/min. Cooling rates of this scale have not been matched for large single crystal materials.

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