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The effect of liquid Silicon on the AlN crystal growth

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The question of why a high-quality bulk AlN crystal can be grown on a SiC seed, which is superior in a number of parameters to the same crystal grown on its own seed, remains open. We set ourselves the task of comprehensive analysis of the process of the formation of bulk AlN crystals on SiC using Raman spectroscopy, X-ray diffraction, energy-dispersive X-ray spectroscopy, secondary ion mass spectroscopy, and optical microscopy. We managed to detect silicon on the surface of the grown AlN crystals and traces of silicon at the SiC/AlN phase boundary. In connection with this discovery, we consider a new model for the formation of high-quality bulk AlN crystal growth on SiC substrates through the formation of a layer of liquid silicon. The application of this model will facilitate the growth of large, high-quality AlN crystals.

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