Growth of Single Crystalline ZnGeN$_2$ from Zn/Ge Melts$^1$ TIMOTHY J. PESHEK, KATHLEEN KASH, Physics Department, Case Western Reserve University, JOHN C. ANGUS, Chemical Engineering Department, Case Western Reserve University — We present the first evidence for the growth of ZnGeN$_2$ from a nitrogen saturated Zn/Ge melt. ZnGeN$_2$ is the II-IV-V$_2$ compound semiconductor analogue of GaN. Results from photoluminescence spectroscopy and X-ray diffraction suggest that it is nearly identical to GaN in band gap and lattice constants, making it potentially suitable as a GaN substrate or replacement. To date, reported methods of synthesis have been limited to vapor phase deposition on highly lattice-mismatched substrates. The present technique, which does not require the use of substrate, yields hexagonal prisms of ZnGeN$_2$, 40-50 $\mu$m in length along the $[0001]$ direction, and 3-5 $\mu$m wide in cross-section, capped by a round, polycrystalline dome of stoichiometric ZnGeN$_2$. This morphology is highly suggestive of a VLS-like growth mechanism and is evidence that ZnGeN$_2$ may melt congruently at the pressures and temperatures employed.

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Timothy J. Peshek
Physics Department, Case Western Reserve University

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