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Amorphous-Ge Nanocluster Formation During Ion Implantation I.D. SHARP, Materials Science and Engineering, University of California, Berkeley and Materials Sciences Division, Lawrence Berkeley National Laboratory, CA 94720, D.O. YI, Applied Science and Technology, University of California, Berkeley and Materials Sciences Division, Lawrence Berkeley National Laboratory, CA 94720, C.W. YUAN, Q. XU, C.Y. LIAO, Materials Science and Engineering, University of California, Berkeley and Materials Sciences Division, Lawrence Berkeley National Laboratory, CA 94720, J.W. AGER III, Materials Sciences Division, Lawrence Berkeley National Laboratory, CA 94720, DARYL CHRZAN, E.E. HALLER, Materials Science and Engineering, University of California, Berkeley and Materials Sciences Division, Lawrence Berkeley National Laboratory, CA 94720 — Ge nanocrystals formed by ion implantation followed by thermal annealing have an average diameter of 5.1 nm with a distribution full width at half maximum (FWHM) of 3.4 nm. This contrasts with Kinetic Monte Carlo (KMC) and rate equation predictions which give a much narrower distribution. Here, we show that the difference between theory and experiment is the result of amorphous nanocluster formation during room temperature implantation. Therefore, thermal annealing to form nanocrystals is predominantly a crystallization process rather than a conventional nucleation, growth, and coarsening process during thermal annealing. This work is supported in part by U.S. Department of Energy under contract No. DE-AC02-05CH11231 and in part by U.S. NSF Grant No. DMR-0109844.

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