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$Si_{0.7}Ge_{0.3}$ Nanorings Mediated By Ag Nanodots: Structural Evolution and Enhanced Photoluminescence Properties CHIH HO, CHENG-YING CHEN, JR-HAU HE, Natl Taiwan Univ, INSTITUTE OF PHOTONICS AND OPTOELECTRONICS TEAM — Currently nanorings (NRs) are attractive because there is a great deal of interest in nanostructures from theoretical, experimental, and device perspectives. The feasible NR fabrication is demanded in the field of electronic and optoelectronic devices at the nanoscale. In the present study, the growth of high-density $Si_{0.7}Ge_{0.3}$ NRs has been achieved on ultrathin Ag films on $Si_{0.7}Ge_{0.3}$ substrate. In situ ultrahigh-vacuum transmission electron microscopy revealed that the formation of nanorings involves a mechanism mediated by Ag NDs and evaporation of Ag-Si-Ge eutectic liquid at high temperature. $Si_{0.7}Ge_{0.3}$ NRs exhibit the enhanced PL intensity over $Si_{0.7}Ge_{0.3}$ thin film due to quantum size effects. The luminescence efficiency as a function of the size of $Si_{0.7}Ge_{0.3}$ NRs has been investigated. Power-dependent PL demonstrates that the NR mediated by Ag NDs is type-I band alignment. The process promising the availability of type-I $Si_{1-x}Ge_x$ NRs can serve as a useful platform for the fundamental understanding and future practical applications of NRs.

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