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Ge quantum dots grown via buffer layer assisted growth[1]

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Using a buffer-layer assisted growth approach, we have achieved the formation of Ge QDs on Si(l00) without a wetting layer. These QDs possess a narrow size distribution and are substantially smaller with a higher density than Ge QDs grown by other techniques. Both single and multiple layer structures have been grown with this approach using Si spacer layers and capping layers. Since the QDs for each layer are grown on layers of frozen xenon, the QDs for each layer possess the same purity and structure. Hence, PL measurements show the same IR peak energies independent of number of layers. However, the energies and temperature dependence of the PL peaks suggest a contribution by defects. Methods to improve the QD crystalline structure without formation of a wetting layer or intermixing with the Si will be discussed.

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