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Growth of Ge quantum dots on Si(100) without a wetting layer

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When Ge atoms are deposited directly onto a Si(100) substrate, the growth follows the Stranski-Krastanow mode, in which three-dimensional Ge islands, or quantum dots (QDs), are formed on top of three atomic wetting layers. For many optical and electronic applications, Ge QDs *without* the wetting layer are highly preferred. Using the buffer-layer assisted growth approach [1], we have achieved the formation of Ge QDs on Si(100) without a wetting layer for the first time. These QDs are shown to be narrow in size distribution, and also exhibit much stronger quantum size effects. Intriguing optical, structural, and stability properties of such QDs in the novel configuration will also be explored.

[1] J. H. Weaver and G.D. Waddill, Science 251, 1444 (1991).

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