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Optical and Electrical Properties of Self-Assembled Silicon Nanoclusters

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The use of silicon (Si) in optical and optoelectronic devices depends heavily on the development of a Si-based light source. The ability to use Si in such applications will have many advantages, including low fabrication cost and high compatibility with existing technology. Therefore, researchers have explored the use of various techniques to improve the inherently poor luminescence of bulk Si. In recent years, self-assembled Si nanoclusters (Si-NCs) have been shown to be a promising candidate, due to their improved tunable light emission.[1] In spite of such achievements, the luminescence of self-assembled Si-NC devices is still too low in intensity to be used in commercial devices.[2,3] There are also many unanswered questions about the mechanisms responsible for the luminescence displayed by such systems. In our group, we manipulate the growth of self-assembled Si-NCs and study their optical and electrical properties.[4,5] We have examined aspects of this type of system such as the effect of the host material's crystallinity on Si-NC growth, and the impact that doped matrices have on luminescence.

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