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In-plane optical anisotropy in self-assembled Ge quantum dots induced by interfacial chemical bonds CHIH-MING WEI, TZUNG-TE CHEN, YANG-FANG CHEN, Department of Physics, National Taiwan University, Taipei, Taiwan — In-plane optical anisotropy has been observed in self-assembled Ge quantum dots (QDs). It is found that the photoluminescence (PL) spectrum polarized along [110] exhibits different features compared to that corresponding to $[1\bar{1}0]$. Besides, the polarized PL spectrum is able to reveal the detailed fine structure much more pronounced than that in unpolarized spectrum. It is shown that the observed optical anisotropy is a result of the inherent property of the type-II band alignment of Ge QDs embedded in Si matrix. The light emission arises from the recombination of electrons and holes across the interface, and it thus reflects the anisotropic nature of the interfacial chemical bonds. The predicted results according to our proposed mechanism have been successfully tested for SiGe/Si multiple quantum wells as well as superlattices.

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