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**Highly-reduced Fine-structure splitting in InAs/InP quantum dots offering efficient on-demand 1.55 $\mu$m entangled photon emitter** LIXIN HE, University of Science and Technology of China, M. GONG, C-F LI, G-C GUO, University of Science and Technology of China, A. ZUNGER, National Renewable Energy Laboratory — There has been intense recent interest in finding efficient entangled photon sources, including the demonstration of generation of "event-ready" entangled photon pairs via a biexciton cascade process using an (In,Ga)As/GaAs quantum dot(QD). However, a genuine finite energy difference between photons with different polarizations, known as the fine structure splitting (FSS), can destroy the entanglement of the photon pairs. To achieve entanglement from (In,Ga)As/GaAs QD, it was, indeed, necessary to Cherry-pick a sample with extremely small FSS from a large number of samples, or to apply strong in-plane magnetic field. Furthermore, the emission wavelength of (In,Ga)As/GaAs QD (880 - 950 nm) is mismatched with the 1.55 $\mu$m needed for communications using the optical fibers. Using theoretical modeling of the fundamental causes of FSS in QDs, we predict that the intrinsic FSS of InAs/InP QDs is an order of magnitude smaller than that of InAs/GaAs dots, and better yet, their excitonic gap matches the 1.55 $\mu$m fiber optic wavelength,therefore offer efficient on-demand entangled photon emitters for long distance quantum communication.

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