

Rare earth ions for creation of deterministic single photons

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Rare earth ions are interesting candidates for creation of quantum memories because of their large coherence times. But their large lifetimes make them terrible photon sources. By making use of Purcell enhancement, rare earth ions can also be used to create deterministic single photon sources. We use Thulium ions doped in inorganic crystal for creation of deterministic single photon sources at 795nm wavelength. Since at this wavelength, Silicon is not transparent, we use commercially available Lithium Niobate on Insulator (LNOI) to fabricate the nanocavities to enhance the transition. We use Finite difference time domain method to simulate and optimize the parameters for nanobeam cavity to achieve high Q factor and low mode volume. These nanocavities can then be integrated with quantum memories to create quantum repeaters.