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Progress towards quantum memory in telecommunication band HAOQUAN FAN, U. S. Army Research Laboratory; University of Maryland, College Park, DONNY R. PEARSON, University of Maryland, College Park, ELIZABETH A. GOLDSCHMIDT, U. S. Army Research Laboratory; University of Maryland, College Park — The on-demand transfer of quantum states between photons and matter, i.e., quantum memory, is critical for future quantum communications. Quantum memory is a key element for quantum repeaters, which are required to transmit quantum information over long distances. Rare-earth ions (REI) in crystals offer excellent properties for quantum memories, such as long coherence time, high-density, and the potential for integration into photonic devices. Erbium (Er), in particular, allows quantum memory in the telecommunications band, providing a pathway toward practical realization of quantum repeaters suited for modern optical communication standards. In addition, Er has a near infrared transition that should allow quantum memory with built in frequency conversion from the near infrared to the telecommunications band. Such frequency conversion is useful for interfacing between different quantum systems. A major challenge in working with Er is the difficulty in optical pumping, although some progress has been made recently optically pumping on the telecommunications transition at low temperature and high magnetic field. We report progress investigating optical pumping on the near infrared transition in Er:YVO.

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