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Physical Vapor Transport Growth and Characterization of Fe:Znse crystals[1] DEBLINA DAS, RICK WATKINS, VLADIMIR FEDOROV, SERGEY MIROV, University of Alabama at Birmingham — Recent progress in iron-doped II-VI chalcogenide laser materials enabled significant advancements in room temperature high-energy, high-power laser systems operating over 3.5-6.0 μm. Iron doped ZnSe/ZnS crystals are potential choice for lasers with direct access to the mid-wave infrared spectral range with promising energy scaling capability. One of the most common Fe:ZnSe gain elements fabrication method is based on chemical vapor transport growth of polycrystalline ZnSe followed by post-growth thermal diffusion of iron. Due to the relatively small coefficient of Fe^{2+} ions diffusion in ZnSe (D=3.7x10^{-10} cm^2/s at 950^0), this approach limits the fabrication of considerable size, homogenously doped Fe:ZnSe crystals. Here we report on a simple method of large size (12x50 mm) Fe:ZnSe elements fabrication in sealed vacuumed ampoules via physical transport growth from thin Fe:ZnSe workpieces prepared by post-growth thermal diffusion of Fe in ZnSe starting material. The growth process was optimized in terms of temperature gradient through the ampoule, annealing temperature, exposure time, and the crystal's optical loss. Fabricated iron doped and undoped ZnSe crystals were characterized by XRD and Raman spectroscopy.

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