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Cascade random-quasi-phase-matched harmonic generation in polycrystalline ZnSe[1] HERBIE SMITH, ROTEM KUPFER, HERNAN QUEVEDO, LUC LISI, GANESH TIWARI, C. GRANT RICHMOND, BRANT BOWERS, University of Texas at Austin, LI FANG, University of Texas at Austin, Ohio State University, B. MANUEL HEGELICH, University of Texas at Austin; Center for Relativistic Laser Science, Institute for Basic Science, CENTER FOR HIGH ENERGY DENSITY SCIENCE TEAM — We experimentally studied cascade random-quasi-phase-matched harmonic generation in polycrystalline zinc selenide with a mid-infrared nanosecond laser. Observations show a sudden transition between two scaling regimes, below I^N and above I^N respectively, where I is the pump intensity and N is the harmonic order. To understand this phenomenon, we simulated the coupled three-wave mixing equations that govern the process on a domain of randomly-oriented, randomly-sized grains. We found that the phase-matching condition varies with grain size, indicating that grain size manipulation can be used as a pathway for phase-matching optimization of various wave mixing effects in polycrystalline materials.

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