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Abstract:

We investigate the energy relaxation of excitons during the real-space transport in ZnSe quantum wells by using microphotoluminescence with spatial resolution enhanced by a solid immersion lens. The spatial evolution of the LO-phonon sideband, originating from the LO-phonon assisted recombination of hot excitons, is measured directly. By calculating the LO-phonon assisted recombination probability, we obtain the nonthermal energy distribution of excitons and observe directly the energy relaxation of hot excitons during their transport. We find the excitons remain hot during their transport on a length scale of several micrometers. Thus, the excitonic transport on this scale cannot be described by classical diffusion.