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**Nature of Room-temperature Photoluminescence in ZnO** W. SHAN, W. WALUKIEWICZ, J.W. AGER III, K.M. YU, Lawrence Berkeley National Laboratory, H.B. YUAN, H.P. XIN, G. CANTWELL, ZN Technology, J.J. SONG, UC San Diego — The temperature dependence of the photoluminescence (PL) transitions associated with various excitons and their phonon replicas in high-purity bulk ZnO has been studied at temperatures from 12 K to above room temperature (320 K). The evolution of the emission lines with temperature allows us to unambiguously study the PL process in ZnO and to elucidate its nature at room temperature. The room-temperature PL in ZnO is shown to be a free-exciton annihilation process. The process is dominated by the simultaneous emission of photons and longitudinal optical phonons with  $E_{FX-1LO}$  emission at the maximum due to the strong exciton-phonon coupling in the material. The results explain the discrepancy between the transition energy of free exciton determined by reflection measurement and the peak position obtained by PL measurement.

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