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X-ray excited photoluminescence in InGaN/GaN MQW structures S.M. O'MALLEY, Rutgers University - Camden, A. KAZIMIROV, P. REVESZ, Cornell High Energy Synchrotron Source, A.A. SIRENKO, New Jersey Institute of Technology — Synchrotron-based x-ray radiation at CHESS (A2 beamline) was used to excite photoluminescence (PL) spectra in InGaN/GaN MQW structures. Both, cw and time-resolved techniques have been performed in detecting the PL signal. The peak of x-ray PL (XPL) for GaN layers coincides with that for conventional laser excitation, while the XPL peak for the InGaN active region has a 50 nm shift compared to spectra measured with laser-based PL and cathodoluminescence. Time-resolved measurements were done on XPL spectra using a streak camera. The temporal structure of the x-ray synchrotron beam permits exciton life-time measurements in a broad range from 0.5 ns up to a few microseconds. We determined that GaN exciton lifetime varies between 1.3 and 4.5 ns in different structures, while the InGaN exciton lifetime is on the microsecond scale due to higher defect density. Our experimental approach has been extended to the use of x-ray micro-beams. Using this approach a micron-size spot can probe InGaN/GaN device structures simultaneously measuring: (i) x-ray diffraction, (ii) photoluminescence spectra, and (iii) exciton life-times.

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