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Comparative photoluminescence study of crystalline and nanostructured scintillators GEORGE MCKINNEY, WARREN MCDONALD, MARIAN TZOLOV, Lock Haven Univ — Scintillators are widely used for conversion of high energy radiation/particles to visible light which can be either directly observed or further converted to electrical signal in photomultipliers or solid state detectors. We compare the light emission properties of traditional crystalline scintillators with nanostructured films created in our laboratory with the potential for use as scintillators. We have studied zinc oxide (ZnO) nanowires, zinc tungstate (ZnWO_4) thin films, commercially available crystals of ZnO, ZnWO_4 and commercial scintillators of yttrium aluminum garnet (YAG) and yttrium aluminum perovskite (YAP). We will present the photoluminescence emission spectra, the intensity dependence of the emission, and the photoluminescence excitation spectra. We have found that the emission spectrum of zinc oxide nanowires becomes very intense at high excitation intensities and becomes comparable with the emission from the commercial scintillators. The excitation spectra indicate the presence of subgap electronic states in the nanostructured samples and in the commercial scintillators. This study contributes to our effort of creating electron detectors for scanning electron microscopy using nanostructured scintillators.

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