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Thin film scintillators[1] WARREN MCDONALD, GEORGE MCKINNEY, MARIAN TZOLOV, Lock Haven University of Pennsylvania — Scintillating materials convert energy flux (particles or electromagnetic waves) into light with spectral characteristic matching a subsequent light detector. Commercial scintillators such as yttrium aluminum garnet (YAG) and yttrium aluminum perovskite (YAP) are commonly used. These are inefficient at lower energies due to the conductive coating present on their top surface, which is needed to avoid charging. We hypothesize that nano-structured thin film scintillators will outperform the commercial scintillators at low electron energies. We have developed alternative thin film scintillators, zinc tungstate and zinc oxide, which show promise for higher sensitivity to lower energy electrons since they are inherently conductive. Zinc tungstate films exhibit photoluminescence quantum efficiency of 74%. Cathodoluminescence spectroscopy was applied in transmission and reflection geometries. The comparison between the thin films and the YAG and YAP commercial scintillators shows much higher light output from the zinc tungstate and zinc oxide at electron energies less than 5 keV. Our films were integrated in a backscattered electron detector. This detector delivers better images than an identical detector with commercial YAG scintillator at low electron energies.

[1]Thin film zinc tungstate scintillator for low electron energy applications

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