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Investigation of candidate radiation resistant materials with high secondary electron emission yield for Photomultiplier tubes (PMTs) in the readout systems of the ATLAS TileCal.

Photomultiplier tubes (PMTs) play a critical role in the readout systems of the ATLAS TileCal. They rely on dynode materials with high secondary electron emission (SEE) and radiation tolerance. Secondary electron yields correlate with the electrical conductivity of these dynode materials which are usually extremely high band gap insulators. The conductivity in its turn is dramatically affected by radiation induced defects which in high radiation doses cause damaging electronic fatigue. This study investigates the effects of gamma radiation, with doses comparable to the ones in TileCal, on the electrical properties of three candidate dynode materials: CNS, Al_2O_3 and MgO. In addition, secondary electron yield results are shown for pristine and irradiated samples.

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