

ELECTRON PARAMAGNETIC RESONANCE (EPR) DOSIMETRY OF DRYWALL

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Concern regarding the possibility of criminal or terrorist use of nuclear materials has led to an interest in developing the capability to measure radiation dose in a variety of natural and man-made materials. Measurement of radiation dose in “fortuitous” dosimeters is intended to aid in law enforcement, screening of affected populations (triage), and possibly even weapons inspections. Electron paramagnetic resonance (EPR) may be used to perform radiation dosimetry on suitable materials. Historically, this field has linked radiation physics with archaeology and geology; at McMaster University, we are extending EPR dosimetry to materials that are of use in forensic dosimetry.

One such novel EPR dosimeter is drywall, a common construction material composed largely of gypsum (calcium sulphate dihydrate). A radiosensitive EPR signal in drywall has been observed, and suitable dose measurement protocols have been developed. As a proof-of-concept, a drywall slab was irradiated with a ^{60}Co source, and the absorbed dose was measured across the slab. The resulting two-dimensional dose map illustrates the possibility that one can determine the unambiguous former presence and even location of an illicit radioactive source. Possible applications in counter-terrorism and criminal investigations will be discussed.