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**Abstracts**



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### ESR response of alanine films exposed to low-energy (1-40 keV) X-rays

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#### Introduction

L-a-alanine has aroused considerable interest for use in radiation ESR dosimetry. In this work, we examined the energy response of alanine ESR films in the low energy X-photon energy range between 1 keV and 40 keV. Dose measurements through a reference ionization chamber and a semiconductor detection system were also performed to complement ESR measurements.

#### Methods

Commercial alanine ESR films were used. All ESR signal measurements were also done using an X-Band (9.7 GHz) Bruker spectrometer.

The dosimeters were irradiated at the "Livio Scarsi" Laboratory (LAX) of the University of Palermo, where X-ray beams in the 1–40 keV energy range are produced using a Seifert SN60 tube. Reference dosimetry measurements were made using a plane parallel chamber with thin polyethylene membranes. X-ray fluxes and energy spectra were measured with an innovative system based on semiconductor detectors (CdTe, Si) and digital pulse processing (DPP) electronics.

#### Results

The response of alanine to low-energy X-rays was characterized experimentally. The response as function of dose, the dependence of the ESR signal on the photon energy as well as the stability of the signal with time were investigated. Comparison of the ESR response to high energy photons was also carried out. The relative effectiveness is lower if compared to high-energy photons.

#### Conclusion

Alanine dosimeters show very interesting dosimetric features also for these low-energy X-ray beams. To our knowledge, these data have not been previously reported and they may be extremely relevant, e.g., when mapping the high-gradient treatment fields used in microbeam radiation therapy (MRT) with synchrotron radiation.

#### References

M. Marrale et al., Characterization of the ESR response of alanine dosimeters to low-energy Cu-target X-tube photons. Radiation Measurements (2017) doi: 10.1016/j.radmeas.2017.03.009.