Microdosimetric Response of Physical and Biological Systems to Low- and High-LET Radiations

Description: One of the aims of this book was to focus the attention of specialists to the diversity of the effects of the ionising radiation on biological and physical systems. Special emphasis has been placed on the exquisite complexities/differences introduced by high ionisation density versus low ionisation density irradiation in both biological and physical systems (Scholz - Chapter 1, Horowitz - Chapter 2, Olko - Chapter 3). As well we wanted to point out the need for novel experimental and theoretical approaches required to advance the important fields of micro and nanodosimetry. Important first steps have already been taken, for example, the accelerated application of semiconductor detectors in their various forms to microdosimetry and as well to practical, important applications in the radiation dosimetry of oncological procedures (Rosenfeld - Chapter 6). The vast number of applications of TLD to radiation dosimetry are not neglected; a special chapter is devoted to the application of TLDs to medical dosimetry applications (Mobit and Kron - Chapter 7) as well as a tutorial approach in an additional chapter to the cavity theories required to extrapolate dose from the detector medium to the tissue medium (Mobit and Sandison - Chapter 5). One of the major features of this book is the intensive, in depth, coverage of the theory and modelling of TL both from the solid state physics point of view (Chen - Chapter 4) and the microdosimetric point of view (Horowitz - Chapter 2 and Olko - Chapter 3). The many puzzling, quaint, quizzical features of TL science can now be understood in the framework of these advanced theoretical models, explained in straightforward, understandable terms.

- Quantifies/unifies the effects of ionising radiation in both the biological and physical systems
- Authoritative treatment of applications of semiconductor detectors and thermoluminescence dosemeters in medical radiation dosimetry
- Basic and advanced aspects of microdosimetry applied to both biological and physical systems
- In-depth review of the effects of the density of ionising radiation in tsl and osl
- Concise and elegant treatment of cavity theory in medical oncological dosimetry
- Comprehensive review of this important interdisciplinary field including hundreds of illustrations and references

Contents:

1. Dose Response of Biological Systems to Low- and High-LET Radiation (M. Scholz)
2. A Unified and Comprehensive Theory of the TL Dose Response of Thermoluminescent Systems Applied to LiF:Mg, Ti (Y. Horowitz)
4. Dose Dependence of Thermoluminescence (TL) and Optically Stimulated Luminescence with Uniform Excitation (R. Chen)
5. Cavity Theory (P. Mobit and G. Sandison)
6. Semi-Conductor Radiation Detectors in Modern Radiation Therapy (A.B. Rosenfeld)
7. Applications of Thermoluminescent Dosemeters in Medicine (P. Mobit and T. Kron)

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