Analysis of dosimetric properties of quartz crystals under gamma irradiation

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Almugren K.S. [a] ; Sabtu, Siti Norbaini [b] ; Sani, S.F. Abdul [b] ; Dzamrah, Nur Husna [c] ; Shahira, M.N. Nurul [b] ; +2 authors

[a] Department of Physics, College of Science, Princess Nourah Bint Abdulrahman University, Riyadh, Saudi Arabia

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Abstract

This study explored the thermoluminescence (TL) properties of various quartz types (amethyst, citrine, rock crystal, and rose quartz) when exposed to gamma irradiation, assessing their potential for dosimetric applications. Key aspects such as heating rate, glow curves, dose-response behavior, linearity index, sensitivity, and fading characteristics were analyzed for each quartz type. The results revealed significant differences in TL performance among the quartz samples, with each type exhibiting distinct characteristics under gamma irradiation. Amethyst displayed the most reliable TL behavior, with strong linearity and stable dose-response relationships, making it the most suitable candidate for radiation dosimetry. These findings contribute valuable insights into the selection of

optimal quartz materials for radiation measurement, enhancing the precision and reliability of TL-based dosimetric techniques.

Author keywords

Quartz; Radiation dosimetric; Thermoluminescence

Indexed keywords

Engineering controlled terms

Quartz; Quartz applications

EMTREE drug terms

nitrogen; silicon dioxide; silicon dioxide

Engineering uncontrolled terms

Dose response; Dosimetric properties; Exposed to; Gamma irradiation; Glow curve; Quartz crystal; Radiation dosimetric; Response behaviour; Sensitivity characteristics; Thermoluminescence properties

EMTREE medical terms

Amethyst; Article; crystal; crystal structure; crystallography; diagnostic procedure; dose response; dosimetry; environmental monitoring; gamma irradiation; gamma radiation; heating; humidity; measurement precision; measurement repeatability; Natural cluster citrine; quartz crystals; radiation dose; radiation exposure; radiation measurement; radiation safety; reliability; rock crystal; room temperature; temperature; thermoluminescence; triboluminescence; Yellow citrine; article; dosimetry; radiometry; radiotherapy; rock; thermoluminescence

Engineering main heading

Dosimeters

Chemicals and CAS Registry Numbers

Unique identifiers assigned by the Chemical Abstracts Service (CAS) to ensure accurate identification and tracking of chemicals across scientific literature.

nitrogen	7727-37-9
silicon dioxide	10279-57-9, 14464-46-1, 14808-60-7, 15468-32-3, 60676-86-0, 7631-86-9

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Corresponding authors

Corresponding author	S.F.A. Sani
Affiliation	Research Management Centre, Enforcement, Leadership and Management University, Nilai, Negeri Sembilan, 71760, Malaysia
Email address	s.fairus@um.edu.my
Corresponding author	S.N. Sabtu
Affiliation	Research Management Centre, Enforcement, Leadership and Management University, Nilai, Negeri Sembilan, 71760, Malaysia
Email address	norbaini.sabtu@elmu.edu.my

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