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Title: Undergraduate Research on Fully-Automated Thermoluminescent Dosimeter Glow Curve Analysis Software

Abstract
Thermoluminescent dosimeters are in widespread use for personnel and environmental dosimetry. Also, thermoluminescence is often used for geological dating. The sources of error involved in these dosimetry and dating methods include thermoluminescence fading in materials and poor statistical significance due to measurements near the threshold of detectability. Thermoluminescent dosimeter glow curve analysis allows for improved statistics of thermoluminescent materials while highlighting abnormalities in specific data. The mathematical separation of a glow curve into energetically unique portions arising from different electronic trapping states can be used to remove the undesired effects of signal fading for complex materials. Appropriate glow curve analysis also enables the enhanced study of new materials and thermoluminescent phenomenon. Automated glow curve analysis software is presented. Written in C++, the software employs the first-order kinetics model with automatic peak identification utilizing a novel algorithm. Separated glow curves then undergo a least squares curve fitting. The program was performance tested using experimental glow curve data. The first iteration of the software performed rapid, autonomous, accurate analysis for LiF dosimeters at relatively high doses. The latest release is more general, producing results for seven dosimeter types and eliminating the dependence on dose. This software performs comparably to other readily available programs and is fully portable to all major operating systems.