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Design and Performance Test of an Eye Lens Dosimeter C-lens

Recently, with the dose limit of eye lens reduced, a series of problems in research, monitoring, protection and evaluation, have gradually attracted attention. The dosimeter of the eye lens plays an important and foundational role in this circle. This paper mainly focuses on an eye lens dosimeter named C-lens.
Firstly, the type of eye-lens dosimeter, one single LiF:Mg,Cu,P elements with a plastic shell, was chosen. Secondly, with MC simulation method, the energy response and angular response of the dosimeter were optimized and improved by adjusting the thickness, material and shell shape of the dosimeter. Then, the prototype and final dosimeter was completed by 3D printing and injection molding respectively. Finally, the radiation performance of C-lens was tested in a radiation metrology station, which is an IAEA Sub-standard Lab.
The results show that the non-linear response was less than 6% within 0.01 to 100mSv, relative energy response (normalized to 661keV) for photons was between 0.80 and 1.25 in the range of 20.3 to 1250 keV, and the relative deviations of angular response(normalized to 0°) was less than 4%when the incident angle was less than 60°.

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