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Correction of quenching effect of a small size OSL dosimeter using Eu:BaFBr and Ce:CaF₂

Yuho Hirata, Kenichi Watanabe, Akira Uritani, Atsushi Yamazaki, Yusuke Koba, Naruhiro Matsufuji, Takayuki Yanagida, Kentaro Fukuda

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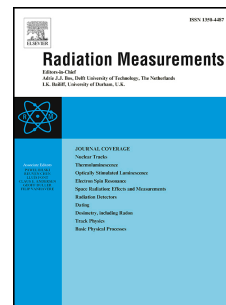
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1 **Correction of quenching effect of a small size OSL dosimeter using Eu:BaFBr and**2 **Ce:CaF₂**3 Yuho Hirata^a, Kenichi Watanabe^a, Akira Uritani^a, Atsushi Yamazaki^a,4 ^a*Graduate School of Engineering, Nagoya University, Furo-cho, Chikusa-ku, Nagoya, 464-8603, Japan*5 Yusuke Koba^b, Naruhiro Matsufuji^b6 ^b*NIRS, Chiba, Japan*7 Takayuki Yanagida^c8 ^c*Nara Institute of Science and Technology, Nara, Japan*9 Kentaro Fukuda^d10 ^d*Tokuyama Corp., Shunan, Japan*

11 Corresponding author: Yuho Hirata, Nagoya University

12 Tel: +81-52-789-3846, Fax: +81-52-789-3844

13 Email: hirata.yuuho@h.mbox.nagoya-u.ac.jp

14 **Abstract**

15 To accurately estimate an actual dose during radiotherapy treatment, dosimeters are required to
16 be inserted into the affected region in a patient's body. Therefore, we are developing a small size
17 dosimeter consisting of optical fibers and optically stimulated luminescence (OSL) elements. We
18 fabricated two types of small size dosimeters using Eu:BaFBr and Ce:CaF₂. We measured the Bragg
19 peak of high energy carbon ions in a water equivalent material. OSL materials showed the quenching
20 effect when irradiated by high linear energy transition (LET) particles. The sensitivity of Eu:BaFBr and
21 Ce:CaF₂ monotonically decreased with different coefficients. The ratio of the signal intensity of these two
22 OSL materials can uniquely determine the sensitivity of each OSL material. We corrected the quenching
23 effect of the OSL dosimeters in the spread out Bragg peak with this relationship.

24 **KEYWORDS:** dosimeter, heavy ion radiotherapy, in-vivo dosimetry, optically stimulated
25 luminescence, optical fiber probe, quenching phenomena

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