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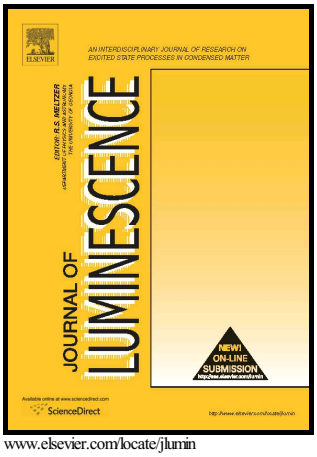

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Thermoluminescence properties of non-stoichiometric $Li_2Si_2O_5$ synthesized from natural amethyst quartz

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ABSTRACT

In the present study, on the contrary of lots of researches, stoichiometric (s-LD) and non-stoichiometric (n-LD) lithium disilicate polycrystalline was tried to synthesize using easily available and cheap natural amethyst quartz samples collected from Balıkesir Dursunbey Turkey as a starting material by high temperature solid state method. Structure and morphology of s-LD and n-LD were done using XRD, FTIR and SEM, showing the main structure as lithium disilicate for n-LD. The findings showed that n-LD had better crystal structure and gave better TL response, so a detail investigation on its main dosimetric properties was studied and presented in this paper. The thermoluminescence (TL) glow curve of n-LD consisted of 3 distinguishable peaks and main peaks was stable since TL sensitivity increased only 12% after 2 kGy of high dose exposure. The reusability results showed that TL intensity decreased maximum 21% and 16% for 5 Gy and 50 Gy, respectively after 11 repeated cycles and n-LD had a superlinearity index (g(D)=1.019). The main peak was just 5 % faded in 4 weeks. Consequently, n-LD as a phosphor might be used in many fields concerning with the dose range from 0.1 Gy up to 100 Gy.

Keywords: $Li_2Si_2O_5$, amethyst, dose response, solid state synthesis

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