Trap and recombination sites of biotite mineral estimated by thermoluminescence analysis

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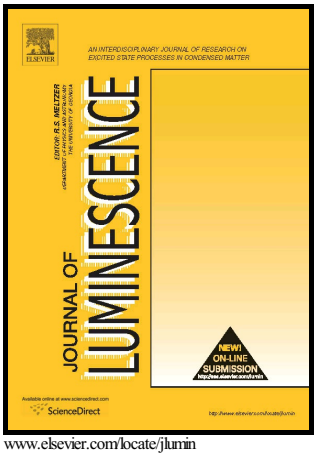

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Trap and recombination sites of biotite mineral estimated by thermoluminescence analysis

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Abstract:

With the help of thermoluminescence (TL) analysis possible trap and recombination levels of natural biotite mineral have been estimated. Differential Scanning Calorimetric (DSC) analysis reveals that within 300–773 K there is no phase change of this mineral. However within this temperature range, some significant changes in trapping sites have been observed. For un-annealed sample one trap and one recombination center has been observed at depth around 1.01 and 3.57 eV respectively. However due to annealing at 473 and 573 K, initially present trap level has been found to shift towards the conduction band and produced a new shallow trap at depth around 0.78 eV. Further annealing at 673 K (or above) a new trap level is found to generate at the previously present site (at depth ~1.01 eV). But during the annealing treatments no significant change in recombination center is observed. Based on the analysis, a schematic band structure of biotite crystal has been proposed showing all possible trap and recombination centers. With reference to the band diagram the whole TL process in biotite have been discussed.

Keywords: Thermoluminescence; Phosphor; Annealing; Trap; Recombination

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