
The luminescence emissions of quartz (TL, OSL and RL)

Marco Martini*^{†1} and Mauro Fasoli¹

¹Dipartimento di scienza dei materiali, Università' di Milano-Bicocca – Via Cozzi 55, 20125 Milano, Italy

Abstract

The use of quartz as a natural luminescence dosimeter (1) is fundamental in OSL and TL dating. Many features of the luminescence emissions are well known, but at the same time still unknown are the defect centres responsible for the emissions. Also unknown are the dynamics that are at the basis of the changes of sensitivity typical of thermal treatments and/or irradiation sequences.

Three main emissions are known to be present in quartz, in the red at around 620 nm, in the blue, around 470 nm, and in the UV at 340-380 nm. These emissions have been detected in many types of luminescence, in TL, OSL and Radioluminescence, RL. Specifically this latter technique, RL, allowed to find out that the blue and the UV emissions are in fact composite (2) and a role of alkali ions has been proposed in the above mentioned changes of luminescence sensitivity typical of quartz, also in the consequences on the activation of Al recombination centres (3-5).

Recent results will be reported on the correspondence of the TL and RL emissions in the blue and in the UV, confirming the composite nature of both these emissions.

Specifically, the presence of two UV emissions could possibly account for the differences present in the literature in the reported effects after irradiation and heat treatments, with important implications in many dating procedures.

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*Speaker

[†]Corresponding author: m.martini@unimib.it