Chapter 7

Conclusion and further suggestion

In general, the studied TL materials have low intrinsic sensitivity to solar UV radiation. For the host phosphor (Ln_2O_3), dopant-type such as terbium (Tb), thulium (Tm), presidium (Pr), erbium (Er) and europium (Eu) can play a role in increasing their sensitivity to UV radiation.

TLD-200 and TLD-900 of commercial TLD, $La_2O_3:Tb^{3+}$, $Gd_2O_3:Tm^{3+}$ and $Gd_2O_3:Eu^{3+}$ are the most sensitive to UV radiation of UV lamp and sunlight. Hence, it is possible to utilize them to detect solar UV radiation using intrinsic method. Their high temperature glow peaks are sensitive to UV radiation and have a linear response with the exposure time to solar UV radiation. Their stability in the dark at room temperature can be an advantage for these TL materials. In addition, their glow peaks was found to have no intrinsic response to visible light which can play an important role in TL fading.

The best response to sunlight was found with TLD-900 that has same linear intrinsic response to UVA and UVB when it was exposed to solar UVR or UV lamp. Potiens and Campos (1996) have observed that, it has more sensitivity to the UVB range with the maximum response at 310 nm.

According to the measurement of solar UV radiation in the campus of University of Malaya, the maximum UV irradiance was found to be between 11:00 am to 1:00 pm. It is preferred to expose these TL materials around noontime due to their low sensitivity to solar UV radiation.

When these TL materials are used in the measurement of solar UVR for a long period, it is advisable to arrange them over a rotor with a solar sensor, which rotate the rotor according to the position of the sun. In this arrangement, the TL materials are always exposed to direct UV radiation. For a short period of solar exposure around noontime, TL materials can be exposed to the sunlight and arranged over a plate of transparent Perspex.

Due to the high light fading of these TL materials, it is better to expose them to sunlight with a certain filter that have high absorption of visible light and high transmitted of UV light, and the deviation in the reading of the TL chips should not exceed 5%.

Other factors such as the sintering temperature will increase the sensitivity to UV radiation (Su et al 1996 and Fukuda et al 1996). Sintering time can also change the sensitivity of TL material to UV radiation (Bassi et al 1975).

The rare earth elements can play a role in increasing the sensitivity of the host phosphor to UV radiation. Due to this indication, it is preferred to dope with other

type of rare earth elements to enhance the sensitivity of the host phosphor to UV radiation.

In some cases, the annealing temperature can play a role in the sensitivity of the phosphor to a certain radiation, it is prefer to use resin material that has high resistance of heating (>300 ^{o}C) instead of Teflon.

In order to know the sensitivity of this material as a function of wavelength, it is better to expose them using narrow bandwidth filter to check their sensitivity at each wavelength.