

Trapped charge dating and thermochronology: recent advances

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Trapped charge dating methods including luminescence and electron spin resonance (ESR) dating are based on the accumulation of unpaired electrons in minerals due to the natural radioactivity. Utilising the most abundant minerals on the earth, quartz and feldspar, the methods can cover the age range from a few years to more than a million years. The methods also have high potential as low-temperature thermochronometers due to the very low closure temperatures ($< 100^{\circ}\text{C}$). For the last 15 years, significant methodological advances took place in the luminescence dating and thermochronology, which made the method robust Quaternary geo- and thermo-chronological tools. ESR dating technique is currently not as robust as luminescence, but the method is an attractive alternative to luminescence dating for extending the age range. In this presentation, I outline the principles of luminescence and ESR dating and introduce several important technical developments including, 1) extended age range of infrared stimulated luminescence (IRSL) dating of feldspar using stable signals and its limitation, 2) recent developments of quartz ESR dating using single aliquots and 3) luminescence and ESR thermochronology.

Keywords: optically stimulated luminescence, infrared stimulated luminescence, electron spin resonance, low-temperature thermochronology