
Ancient TL

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A high performance TL disc

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The TL disc described here was the result of a search for suitable material to use in the auto-regenerative dating of zircons (Sutton and Zimmerman, 1979). Experimental criteria demanded that the disc material should exhibit no spurious, have high thermal conductivity, low emissivity, high reflectivity and mechanical toughness.

I have found that the use of rhodium plated copper provides the optimum choice. Copper discs 9.7mm in diameter and 0.020" thick are electro-plated first with an undercoat of silver and then a thin (1 micrometre) coating of rhodium. Rhodium does not oxidize and, as one would therefore expect, exhibits no detectable spurious TL. The spurious caused by leaving a disc left in air for 1 month is lost in the photomultiplier noise, which for my system means the spurious is less than 0.3cps from room temperature up to 400°C. Because of the thinness of the rhodium/silver coating, most of the disc's thermal conductivity comes from the copper ($k=400 \text{ Wm}^{-1}\text{K}^{-1}$). The emissivity of rhodium is very low ($\epsilon=0.2$ at 650nm and 1400 K). In the range 350 to 550nm the average reflectance of rhodium is 80%. Rhodium is also one of the most durable metals; no cracks or scratches have developed in discs either through repeated cleaning or because of the relative thermal expansion of the copper and rhodium during heating.

By comparison, the properties of other low spurious materials fall short of these discs in one or more respects. The discs can be plated by Twickenham Plating of 6 Colne Road, Twickenham, Middlesex, at a cost of 40 pence per disc.

Reference

Sutton S.R., and Zimmerman D.W. (1979) The zircon natural method: initial results and low level TL measurement. *PACT J.*, 3, 465.

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