

Dysprosium Doped Calcium Sulphate (CaSO₄:Dy) Phosphor Powder for Thermoluminescence Dosimetry

Of the thermoluminescence phosphors, dysprosium doped calcium sulphate (CaSO₄:Dy) phosphor is one of the most efficient phosphors for use in radiation dosimetry, i.e. for monitoring the radiation (Gamma or X-ray) dose received by personnel working with radiation. In the personnel radiation monitoring system comprising mainly thermoluminescence dosimetry (TLD) badges and their readers, the sensitive TLD phosphor powder is used in the making of powder embedded teflon discs which are loaded in the TLD badges in a desired geometry. The TLD discs are also useful for certain diagnostic and therapeutic dosimetric applications in medical physics. Briefly the process consists in dissolving in requisite amounts both the high purity calcium sulphate and dysprosium oxide (Dy₂O₃) in conc. sulphuric acid (H₂SO₄) and then crystallizing out the product by distilling off the H₂SO₄ under reduced pressure. The crystallized product is annealed at a desired temperature and quenched to achieve the high sensitivity of the phosphor powder. Each batch produces 600 g of the phosphor powder.