

TL CaSO₄:Dy,P(KCT-300)

Development of New CaSO₄:Dy,P(KCT-300) TL Pellets

150

가 CaSO₄:Dy TL
 가 Teflon
 Teflon CaSO₄:Dy TL 가
 P CaSO₄:Dy
 TL (KAERI CaSO₄:Dy,P TLD : KCT-300) Teledyne CaSO₄:Dy Teflon
 Teledyne 6

Abstract

CaSO₄:Dy thermoluminescence dosimeter(TLD) is widely used as a personal or environmental dosimeter because of its high sensitivity to radiation. There are many methods to make pellets from the TL powders, sintered disk type dosimeter mixing with Teflon as a bonding material is the most common method. But this method has disadvantage that CaSO₄:Dy pellet does not have very high sensitivity because of large amounts of Teflon. This paper developed a new type of CaSO₄:Dy pellets (KAERI CaSO₄:Dy,P TLD : KCT-300) by using P compounds as a bonding material in CaSO₄:Dy powder, and compared the radiation sensitivity with that of the commercialized Teledyne CaSO₄:Dy pellets. New developed KCT-300 shows about six times higher sensitivity than Teledyne ones, and can be used to measure very low radiation dose.

1.

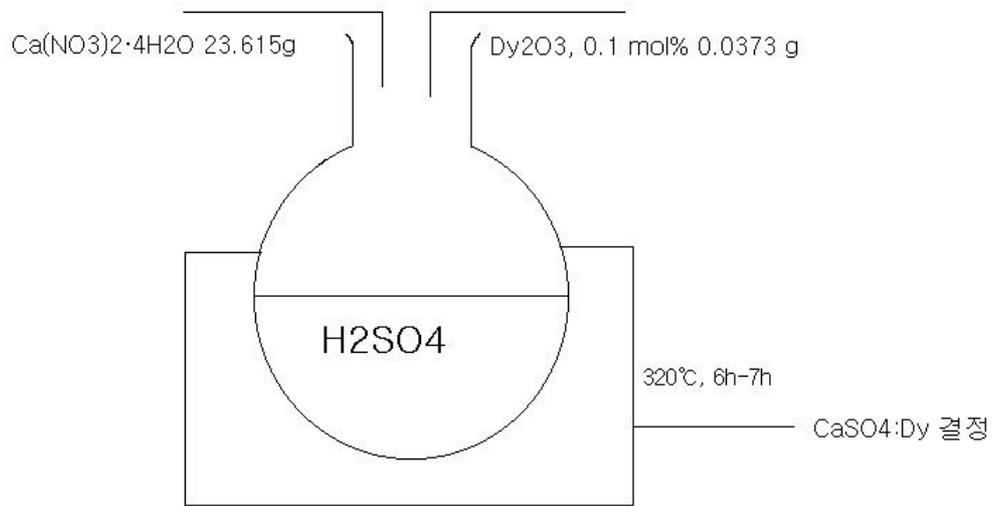
CaSO₄:Dy TL TL CaSO₄:Dy TL
 [1], Teflon

CaSO₄:Dy Teflon TL
 (15-30wt%) CaSO₄:Dy 가
 CaSO₄:Dy TL . CaSO₄:Dy Teflon 가
 [2,3] CaSO₄:Dy Teflon 가
 M. Prokic[4]
 CaSO₄:Dy TL 가 (multi-component inorganic binder)
 CaSO₄:Dy TL P 가
 Teflon .

2. KCT-300

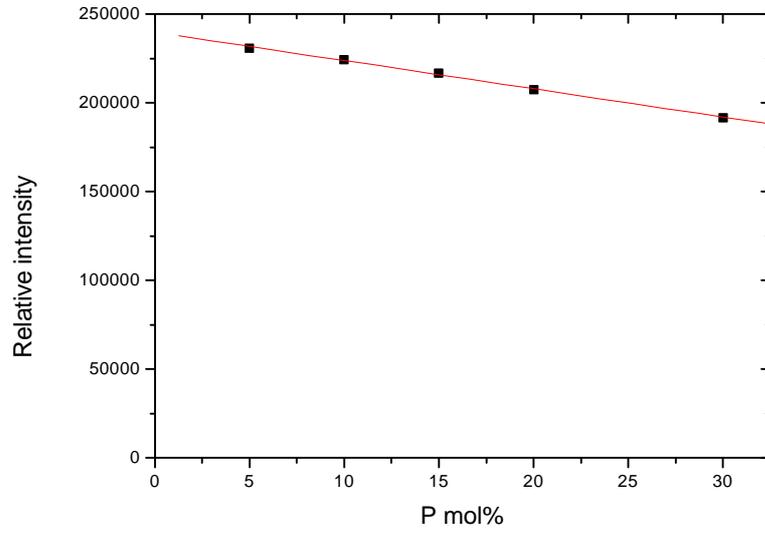
CaSO₄:Dy TL

CaSO₄:Dy TL Yamashita[5] Ca(NO₃)₂ 4H₂O
 H₂SO₄ (extra pure) (Oriental Chemical Industries)
 . 0.0373g Dy₂O₃(0.1mol%) ml 250ml
 23.615g Ca(NO₃)₂ 4H₂O
 가 320 가 , CaSO₄:Dy
 가 200
 700 1 CaSO₄:Dy TL
 1 TL .



Washing, drying, grinding, sieving 750°C, 2h
 100~200 μm CaSO₄:Dy TL 분말

1. CaSO₄:Dy TL



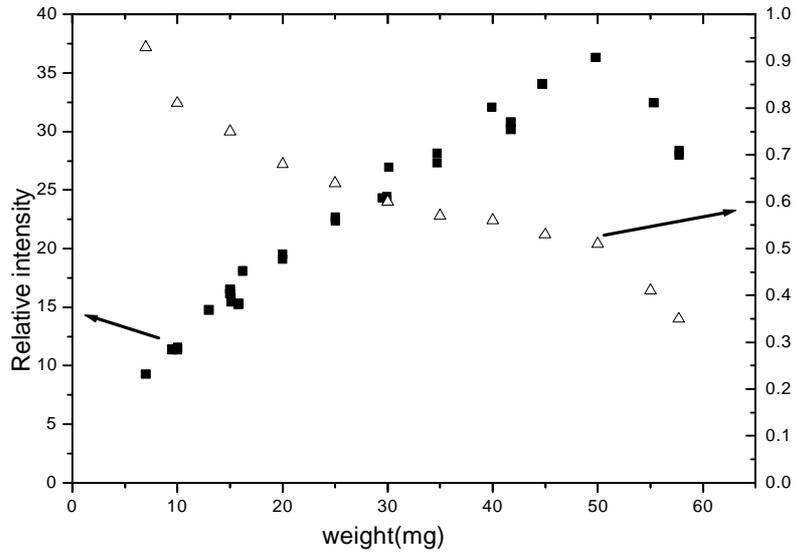
3.

KCT-300

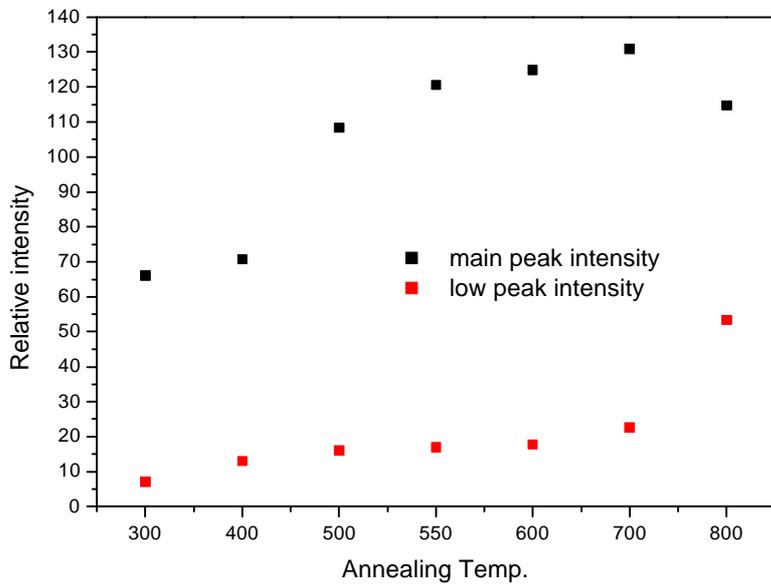
4 10mol% TL
 50mg 가 TL 가 50mg
 TL 가 가 가
 20mg-30mg(0.65-1.0mm)

KCT-300

(NH₄H₂PO₄) 63-100μm 10mol%
 가 TL (cold
 pressing) 4.5mm, 0.8mm, 25.0mg
 100 MPa 가
 KCT-300
 300 800 30
 5 KCT-300
 5 , 400 가
 500 -700 가 가
 700 가
 600 , 30

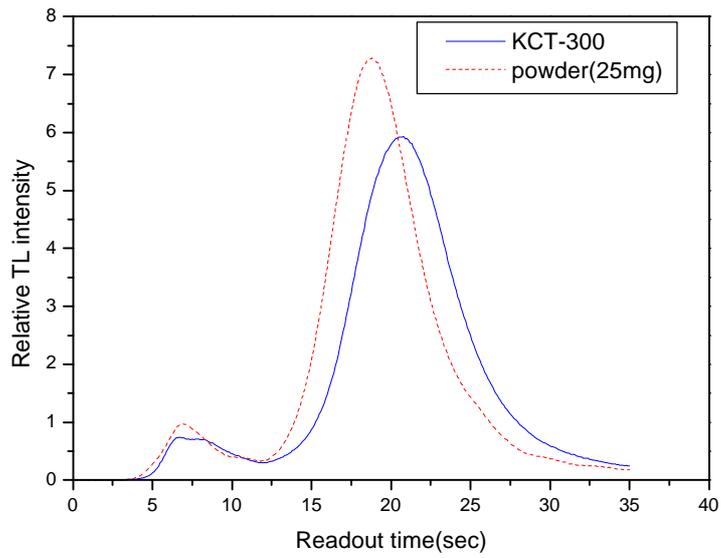


4. KCT (: 10mg) TL
 (: 1)

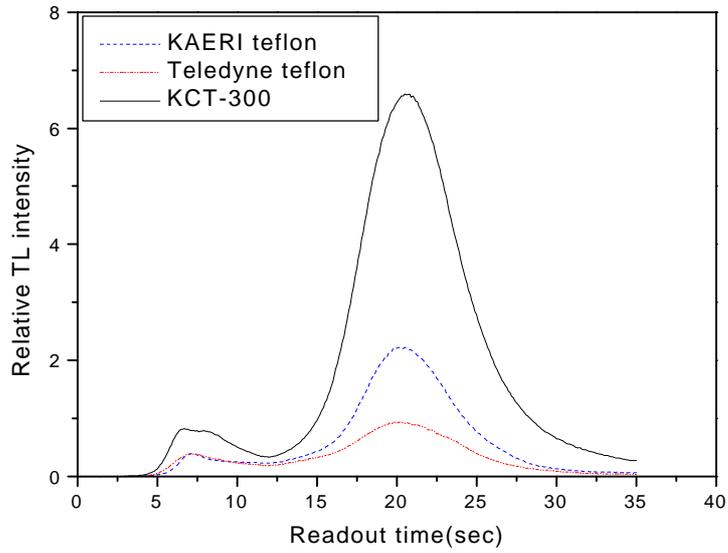


5. KCT-300

KCT-300 TL
 KCT-300 0.8mm, 25mg,
 4.5mm ,
 700 , 1h
 25mg . 6 KCT-300 CaSO₄:Dy
 KCT-300 ,
 90%
 7 KCT-300 Teflon
 CaSO₄:Dy Teflon , KAERI
 Teledyne . Teflon
 4.5mm KCT-300 가 . Teflon 0.4mm, 14mg,
 Teflon 가 KCT-300 Teledyne
 Teflon 6 . KCT-300 Teledyne



6. KCT-300 CaSO₄:Dy



7. KCT-300 Teflon

3.

CaSO ₄ :Dy		P	가	KCT-300
	KCT-300		P	10mol%
	100MPa	600	30	
가	TL	가	KCT-300	가
	TL			
	Teledyne	CaSO ₄ :Dy	Teflon	6

가

1. M.G.Guelev., I.T.Mesehev, B.Burkhardt and E.Piesch. A two-element CaSO₄:Dy dosimeter for environmental monitoring. Radiat.Prot.Dosim.51, 35-40(1994)
2. S.S.Shastry, S.S.Shinde and R.C.Bhatt. Thermoluminescence response of CaSO₄:Dy sintered pellets. Int. J.Appl.Radiat.Isot 31, 244-245(1980)
3. S.P.morata, A.M.P.Gordon, E.N.D.Santos, L.Gomes, L.L.Campos, L.Prado, M.M.Vieira and V.N.Bapat. Development of a state dosimetry based on thermoluminescent CaSO₄ crystals. Nucl.

Instrum. Methods. 200, 449-455(1982)

4. M.Prokic. Thermoluminescent characteristics of calcium sulphate solid detectors. Radiat. Prot. Dosim.37, 271-274(1991)
5. T.Yanashita, N.Nacla, H. Onishi and S.Kitamura. Calcium sulphate activated by thulium or dysprosium for thermoluminescence dosimetry. Health Phys. 21, 295-300(1971)