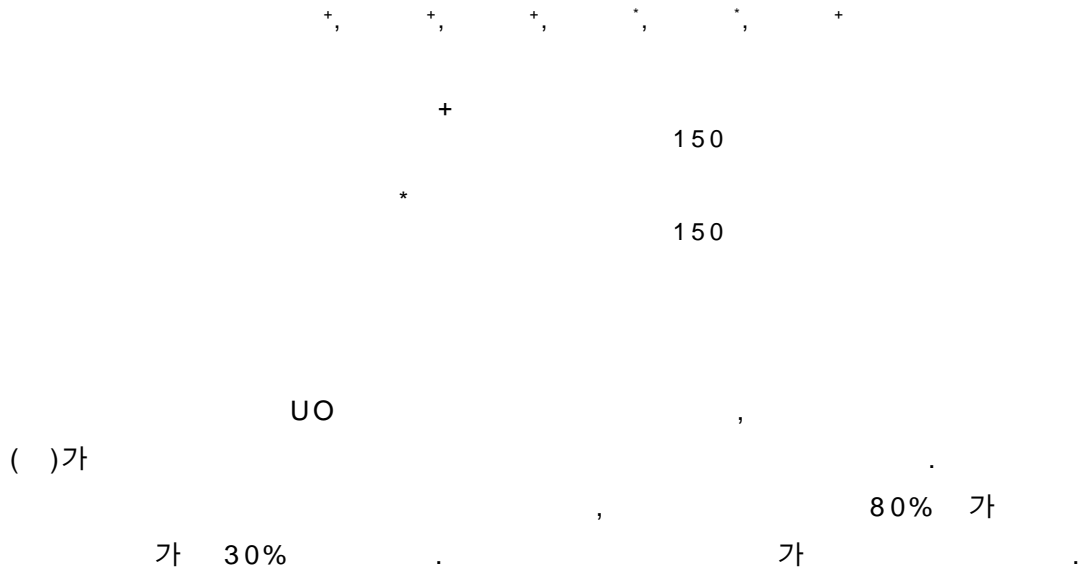




### Fabrication of large-grained UO<sub>2</sub> pellets



#### Abstract

A method of fabricating large-grained UO<sub>2</sub> pellets has been developed for high burnup fuel. KAERI and KNFC jointly have made an experiment to manufacture proto-type pellets in production line using this method. Large-grained UO<sub>2</sub> pellets have been manufactured without difficulties, and they have a grain size larger by 80% than the conventional pellet. In addition, they exhibit lower density increment by 30% after the resintering test.

1.

(UO<sub>2</sub>) (Xe, Kr) mechanism ,

$UO_2$  가  
 1970 가  
 가  $Nb_2O_5, TiO_2, Cr_2O_3, Al_2O_3, SiO_2$   
 [1].  $Nb_2O_5$  0.3 wt% 가  $40 \mu m. TiO_2$   
 0.1 wt% 가  $60 \mu m$  [2] ( 가 가  $UO_2$  8  
 $\mu m$ ). 가 가 가 , ,  
 , 가 가 2  
 . 가  $UO_2$   
 [3],  $UO_2$  , 가  $UO_2$   
 , 가  $UO_2$  가 가  
 가 , 가  
 가  $UO_2$   
 [4].  $U_3O_8$   $UO_2$   
 $UO_2$  [5].  
 $U_3O_8$   $U_3O_8$   $UO_2$   $U_3O_8$   
 .  $U_3O_8$   $UO_2$  5 wt%  
 15  $\mu m$  80% 가 .  
 spec , 가  
 , 가 ( )  
 가 2 1 kg batch

2.

2.1.

$UO_2$  1 .  $UO_2$   
 ( , , , ) ,  $UO_2$   
 450-500  $U_3O_8$  .  $UO_2$

UO<sub>2</sub> U<sub>3</sub>O<sub>8</sub> 1300 U<sub>3</sub>O<sub>8</sub> U<sub>3</sub>O<sub>8</sub> 5%  
 , 80%  
 2(a) 2(b)  
 U<sub>3</sub>O<sub>8</sub> 2(c) 2(c) U<sub>3</sub>O<sub>8</sub>

2.2

1 DC-UO<sub>2</sub> 150g 3 batch A  
 batch , B batch 4 wt% U<sub>3</sub>O<sub>8</sub> , C batch  
 6wt% U<sub>3</sub>O<sub>8</sub> batch  
 2 1 kg batch size 2 batch  
 D batch , E batch 5 wt% U<sub>3</sub>O<sub>8</sub>  
 D E batch 1

(1250 /1 / )  
 1700 /24 /

Image analysis

program

3.

Batch A, B, C 5.920, 5.939, 5.963 g/cm<sup>3</sup>  
 가 batch 가 가 U<sub>3</sub>O<sub>8</sub>  
 가 Batch A, B, C  
 10.499, 10.416, 10.462 g/cm<sup>3</sup> batch A C 가 batch  
 B ( 0.3~0.4%TD)  
 Batch A, B, C 3(a), 3(b), 3(c) batch  
 가 3  
 4 batch A C  
 Batch A C 1.5μm 9μm  
 가 가  
 Batch A, B, C 5(a), 5(b), 5(c)  
 Batch A, B, C 7.8, 11.9, 14.0 μm 6wt%  
 U<sub>3</sub>O<sub>8</sub> 가 (batch C) UO<sub>2</sub>  
 (batch A) 가 80% 가 Batch A  
 , batch B batch A

15 20 $\mu$ m 가  
 . Batch C  
 가 가  
 가 가  
 가 UO<sub>2</sub> 가 ,  
 가 U<sub>3</sub>O<sub>8</sub>  
 가 UO<sub>2</sub>  
 UO 가  
 ( U<sub>3</sub>O<sub>8</sub> ) ,가 가

batch 가 가 1 . Batch C  
 가 batch A 30% 가 , batch C  
 . batch가 가 가  
 가 , 가 3  
 . batch C 가 .  
 6 batch A, B, C 가 .  
 , batch 가  
 가가 , batch C batch A  
 , batch C 가 batch  
 A ,  
 U<sub>3</sub>O<sub>8</sub> 가

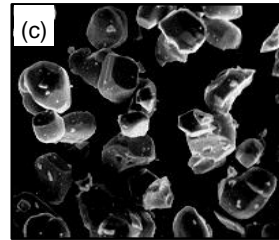
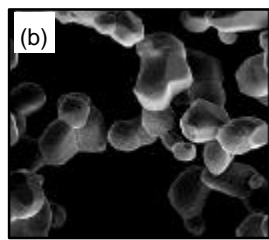
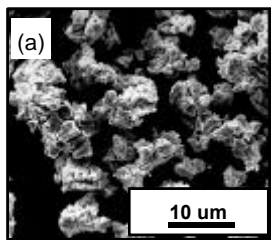
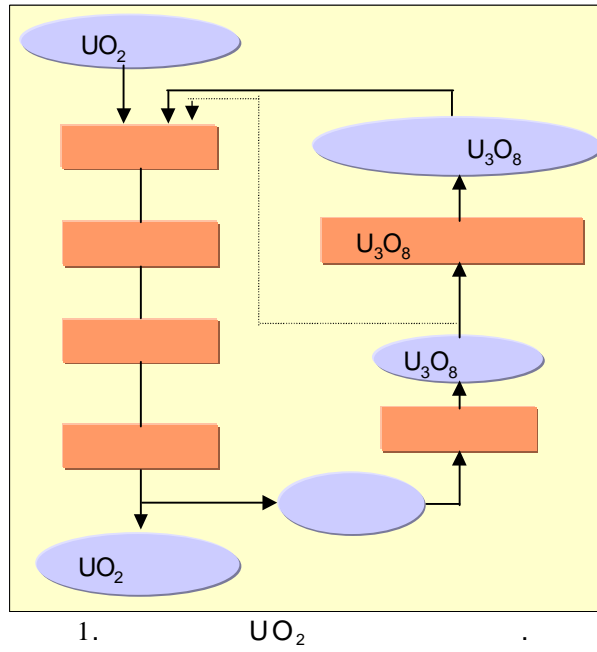
4.

- 6 wt% U<sub>3</sub>O<sub>8</sub> 가 UO<sub>2</sub>
- 가 7.8 $\mu$ m 14.0 $\mu$ m 80% 가 .
  - 가 0.505 %TD 0.352 %TD 30% .
  - (1.5, 9 $\mu$ m) .

- [1] , KAERI/RR/1735/96.
- [2] , '97 ( ), pp 43-48.
- [3] J.B. Ainscough et al, IAEA-SM-233/16, 1979.
- [4] Y. Harada and S. Doi, J. Nucl. Sci. & Tech. 35 (1998) 411.
- [5] , '99 (II)

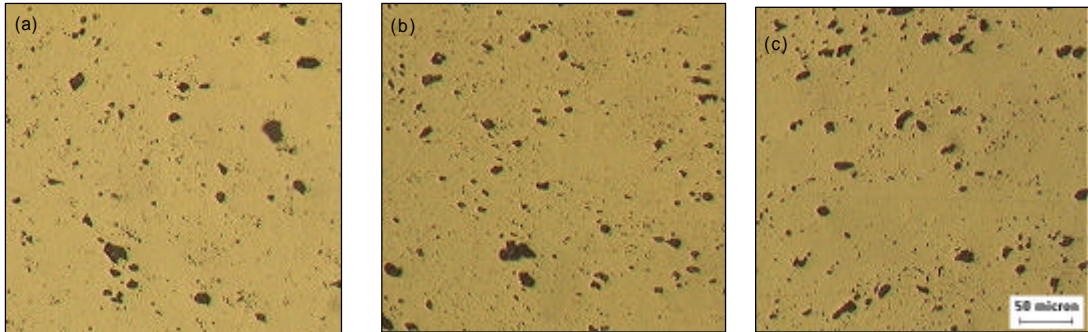
1. batch A, B, C

batch	(%TD)	( $\mu\text{m}$ )	가 (%TD)	가 ( $\mu\text{m}$ )
A	95.45	7.8	0.507	4.2
B	95.16	11.9	0.473	4.0
C	95.43	14.0	0.360	2.1



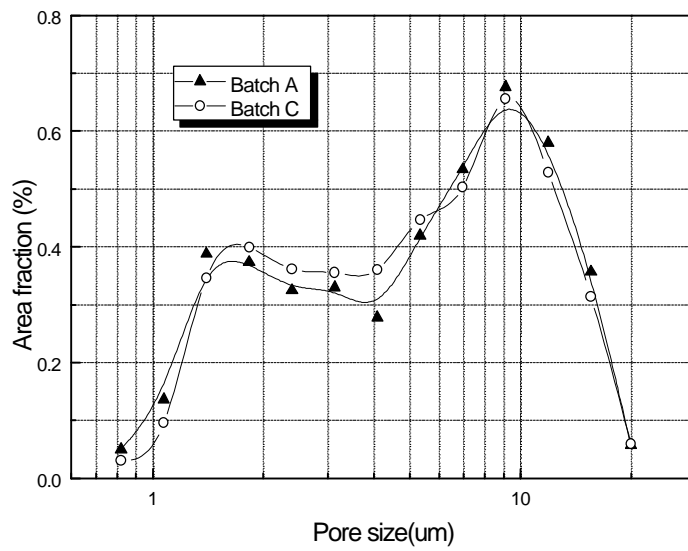
2.  $U_3O_8$

(a)  $U_3O_8$  , (b)  $U_3O_8$  , (c)  $U_3O_8$

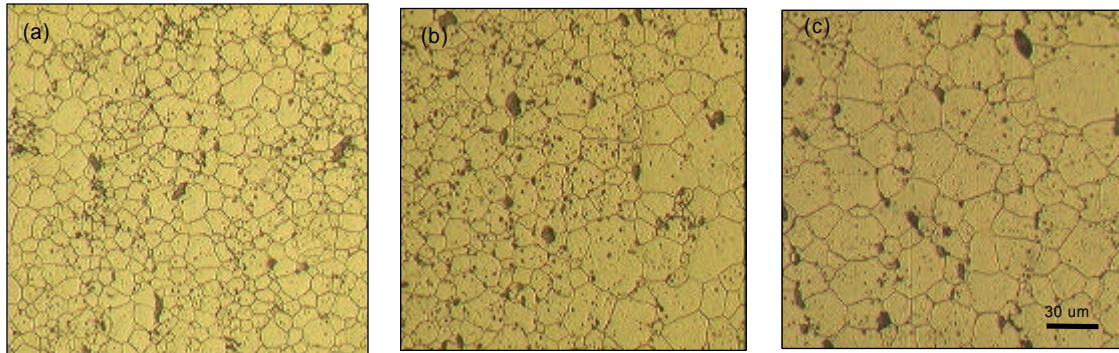


3. batch

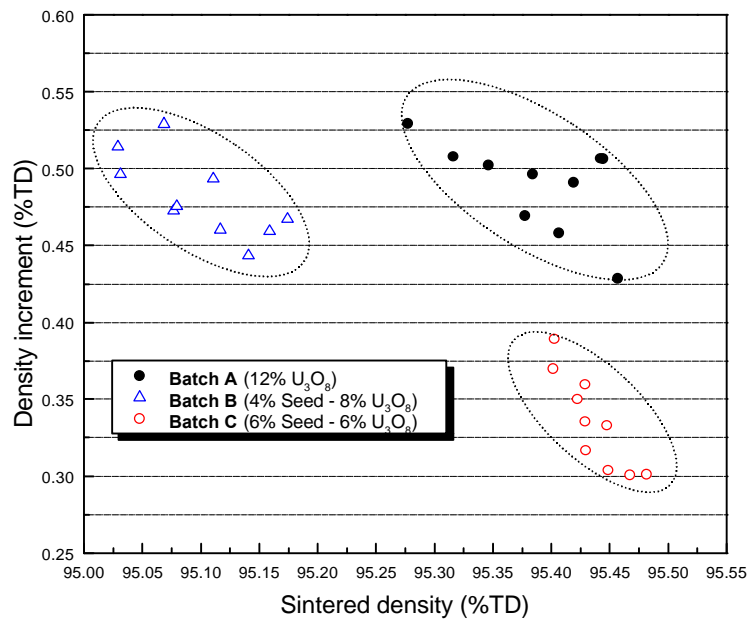
(a) batch A, (b) batch B, (c) batch C



4.



5. , (a) batch A, (b) batch B, (c) batch C.



6.

가.