

Phase evolution and oxide ion conduction behavior of $\text{Dy}_{1-x}\text{Bi}_x\text{O}_3$ ($0.00 \leq x \leq 0.50$) composite system

Vasudhara¹, S. J. Patwe¹, A. K. Sahu², S. N. Achary¹ and A. K. Tyagi¹

¹Chemistry Division, Bhabha Atomic Research Centre

Mumbai 400085, India

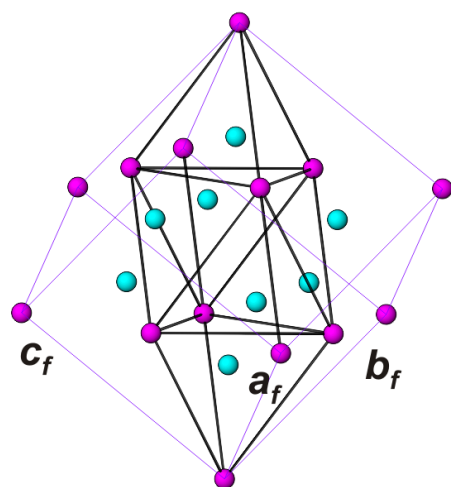
²Glass & Advanced Ceramics Division, Bhabha Atomic Research Centre

Mumbai 400085, India

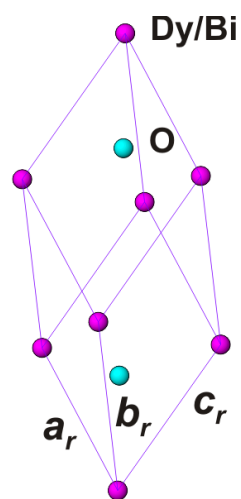
Supplementary Information

- S-I. Relation between the structure of cubic $\delta\text{-Bi}_2\text{O}_3$ and average structure of rhombohedral $\text{Dy}_{0.56}\text{Bi}_{0.44}\text{O}_{1.50}$.
- S-II. Typical observed and calculated inert-planar spacing in rhombohedral sub and super structure.
- S-III. Analysis elemental compositions from EDX spectra
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- S-V. SEM micrographs of $\text{Dy}_{0.56}\text{Bi}_{0.44}\text{O}_{1.50}$ at higher resolution. The lower panel indicates the elemental EDX line profile. (Blue: Bi, Green: Dy and Red: O)
- S-VI. SEM micrographs of $\text{Dy}_{0.50}\text{Bi}_{0.50}\text{O}_{1.50}$ at higher resolution. The lower panel indicates the elemental EDX line profile. (Blue: Bi, Green: Dy and Red: O)

S-I. Relation between the structure of cubic $\delta\text{-Bi}_2\text{O}_3$ and average structure of rhombohedral $\text{Dy}_{0.56}\text{Bi}_{0.44}\text{O}_{1.50}$.



$$a_r = 3.82 \text{ \AA}, \alpha_r = 60^\circ$$



$$a_r = 3.858 \text{ \AA}, \alpha_r = 58.54^\circ$$

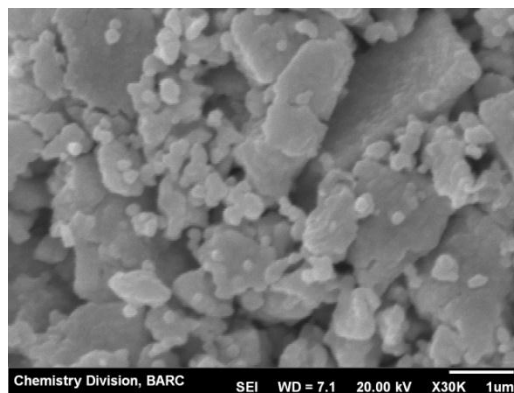
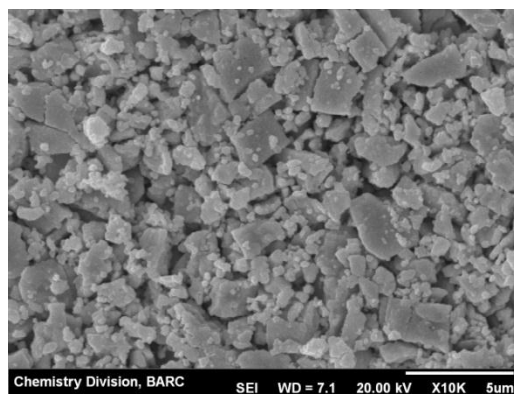
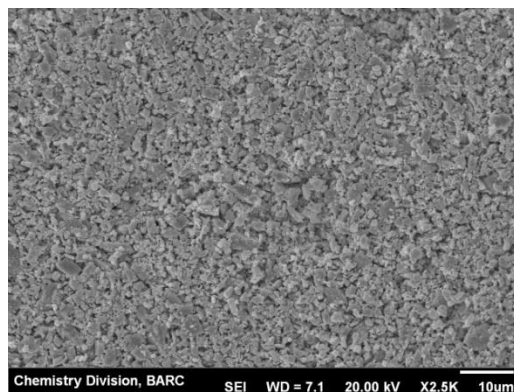
S-II. Typical observed and calculated inert-planar spacing in rhombohedral sub and super-structure.

	a = 3.7728 Å, c = 9.5541 Å, V = 117.77 Å ³		a = 15.210(1) Å, c = 19.067(3)Å, V = 3820.1(8) Å ³	
d(obs) Å	h k l	d(cal) Å	h k l	d(cal) Å
4.766			0 0 4	4.767
3.612			3 0 3	3.613
3.529			2 2 2	3.532
3.181	0 0 3	3.183	0 0 6	3.178
3.088	1 0 1	3.091	1 0 6	3.089
2.897			3 1 4	2.900
2.695	0 1 2	2.696	2 2 5	2.693
2.541			5 0 2	2.539
2.361			5 1 0	2.366
2.285			4 0 6	2.287
2.209			4 2 4	2.207
2.112			4 3 2	2.112
2.052			4 3 3	2.050
1.962			4 2 6	1.960
1.927	1 0 4	1.927	5 2 4	1.929
1.885	1 1 0	1.886	1 0 10	1.887
1.831			2 0 10	1.831
1.751			7 0 4	1.750
1.668			5 2 7	1.668
1.649	0 1 5	1.649	4 0 10	1.650
1.622	1 1 3	1.623	8 0 2	1.623
1.610	0 2 1	1.610	7 2 0	1.609
1.592	0 0 6	1.591	8 0 3	1.594
1.546	2 0 2	1.546	5 0 10	1.545
1.470			6 4 3	1.470
1.408			7 1 8	1.408
1.366			7 4 0	1.366
1.348	2 0 4	1.348	9 1 3	1.349
1.324			8 3 2	1.324
1.299			6 5 5	1.298
1.259	1 0 7	1.259	7 5 1	1.259
1.241	2 0 5	1.241	3 2 14	1.242
1.224	2 1 1	1.225	6 6 4	1.225
1.217	1 1 6	1.216	10 0 6	1.217
1.196	2 1 2	1.196	11 0 1	1.195
1.160			7 6 2	1.160
1.120	1 0 8	1.121	5 1 15	1.120
1.097	2 1 4	1.097	7 6 6	1.097
1.089	3 0 0	1.089	5 2 15	1.089
1.047	2 0 7	1.047	6 0 16	1.047
1.037	2 1 5	1.037	12 1 3	1.037
1.031	3 0 3	1.030	11 3 1	1.030

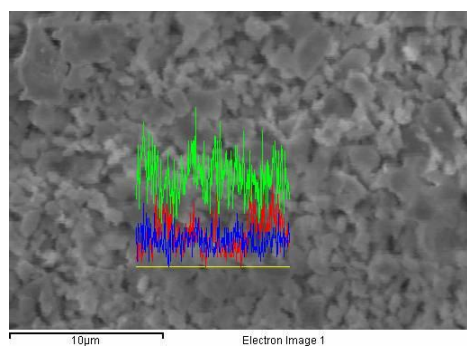
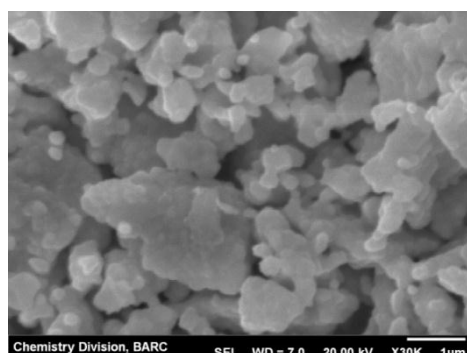
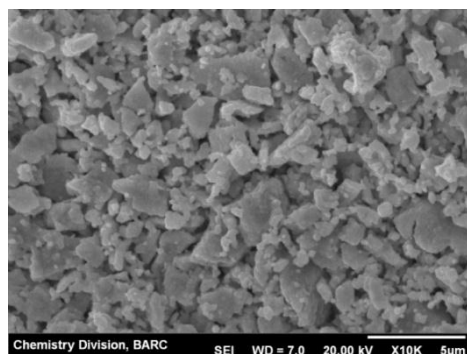
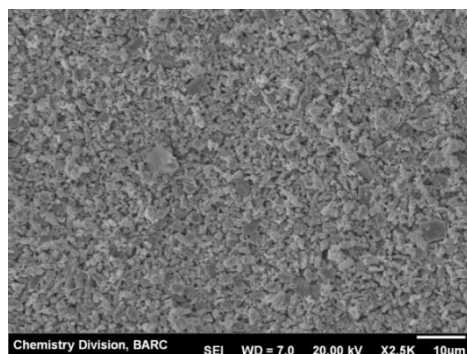
S-III. Analysis elemental compositions from point EDX spectra

Compositions	Point	Observed elemental concentration (%)			Expected elemental concentration (%)		
		Dy	Bi	O	Dy	Bi	O
Dy _{0.56} Bi _{0.44} O _{1.50}	1	26.87	13.13	60.00	26.8	13.2	60.0
	2	25.79	14.21	60.00			
Dy _{0.67} Bi _{0.33} O _{1.50}	1	22.60	17.40	60.00			
	2	22.76	17.74	60.00	22.8	17.6	60.0
	3	22.92	17.08	60.00			
Dy _{0.50} Bi _{0.50} O _{1.50}	1	20.08	19.16	60.00	20.0	20.0	60.00
	2	18.91	21.08	60.00			

S. IV. SEM micrographs of $\text{Dy}_{0.67}\text{Bi}_{0.33}\text{O}_{1.50}$ at higher resolution.



- S. V. SEM micrographs of $\text{Dy}_{0.56}\text{Bi}_{0.44}\text{O}_{1.50}$ at higher resolution. The lower panel indicates the elemental EDX line profile. (Blue: Bi, Green: Dy and Red: O)



S.VI. SEM micrographs of $\text{Dy}_{0.50}\text{Bi}_{0.50}\text{O}_{1.50}$ at higher resolution. The lower panel indicates the elemental EDX line profile. (Blue: Bi, Green: Dy and Red: O)

