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AFFILIATIONS

[1]G , , , l , , C , , r , G , , , , , , 430074, C ,
[2]l , , M , k , r , , , A , , , , , , , , , , 47, K , , 04001, , , ,
[3] , , , E , k , , M , k , , , , , , M , r , , r , , L , , , L , , E1 4N , , , K , ,
[4]N , , , K L , r , r , , , , , D , , , l , , F , , , C , , A , , E , k , , , ,
M , , 621900, C ,
[5]N , , , , L , r , r , H , , , , , 11 0L , , , K , ,
[6]E , k , , , L , F k , , rr G 99 , , , K , ,
[7] , , , , , , , , , , , , , L , , , r , , L , , 730000, C ,

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ABSTRACT

M . H , - A , D . H , A B 5.25La0.75F C 3O18 P . A , *in situ* F 3+ O F 3+, C 3+ O C 3+, F 3+ O C 3+ - . . A , C /F - .

M (FE) A B 5F 3O15 (=4) B 6F 2 3O18 (FM) (=5), B 4 3O12 , , BF O3, FE FM .[12,13] B - , .[1 4] H , - C F B- , B 5F 0.5C 0.5 3O15 (=4) B 6F C 3O18 (=5) .[5] , - A (B 2O2)2+(A -1B O3 +1)2− (A -, .[14,15] H , 12- - , B - D -) B- BF O3 - .[7 11] .[16] , - A .

I , A a B 5.25La0.75F C 3O18 (BLFC) a a a P a a (P). Pa a La a a a a , C , - a a F , a a a a .[14,17] D a a A a a a a - a a a b a , P BLFC a a a a a a b a a a a . a A a - a - , - a .[18] a a a a a a a a - a a a a a - A a , a in situ a a a I H a I I N a a a , AL, D , O , K. F a a a a a - a a a a a a a a a ( ). , a a A BLFC a a a a P a a a a a a . BLFC a a a a a P . a a a a , a - a a , a a a a a a a .

F 1 - a a (D) a BLFC . A a a a B2cb a a a - a A a , a a a a a a a A2₁a a , a - a A .[19,20] a a a - B2cb $a = 5.4530(2)$ A, $b = 5.4427(1)$ A, a $c = 50.670(2)$ A a - a A2₁am a $a = 5.4651(6)$ A, $b = 5.3943(6)$ A, a $c = 41.487(2)$ A a a F P a a a (:// . .).

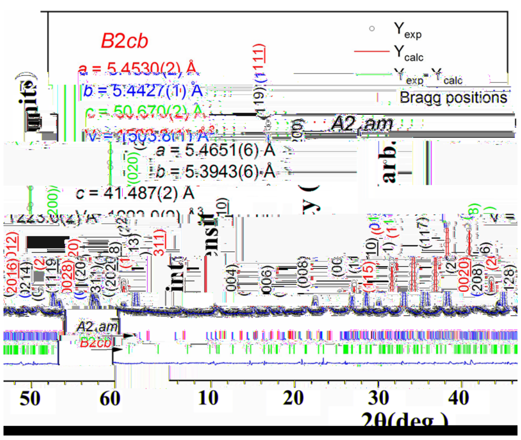

FIG. 1. - t tt t .

a a BLFC a - a A a a = 4 a = 5 a . N a a a D' a . F 1 EM a - BLFC a . a - a (a–b a) a a a P . M , a a a a a a a a F . 1 a - a a a a 1.4 . %, a D. ED a a a (F . 2 a a 1) a a a a a F , C , O, a . , a a a C 2F O4 a a a a a- . a a a a a - a A B 5F 0.5C 0.5 3O15.[16] F 2(a) a a BLFC a a a P a (50, 70 100, 300, a 500 H). a a a 1060 K FE T BLFC . H , a a BLFC a a B 6 3F 2O18 a (a 973 K).[13] F 2( ) P–E a I–E BLFC a a a a P a . a I–E a ,[21,22] a a . a a a a BLFC 10 μC/ 2. F 2( ) a - (FC) a - (FC) a a a a a 200 O BLFC . a BLFC

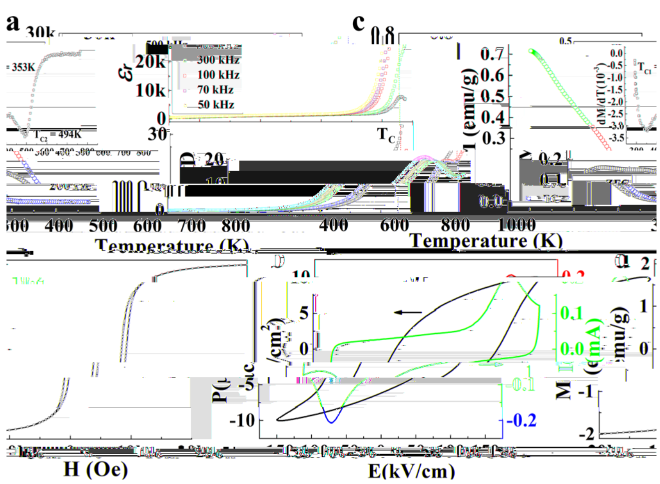

FIG. 2. ( ) = 200 ( ) 300

tt . 117, 052 03 (2020) 10.1063/5.001

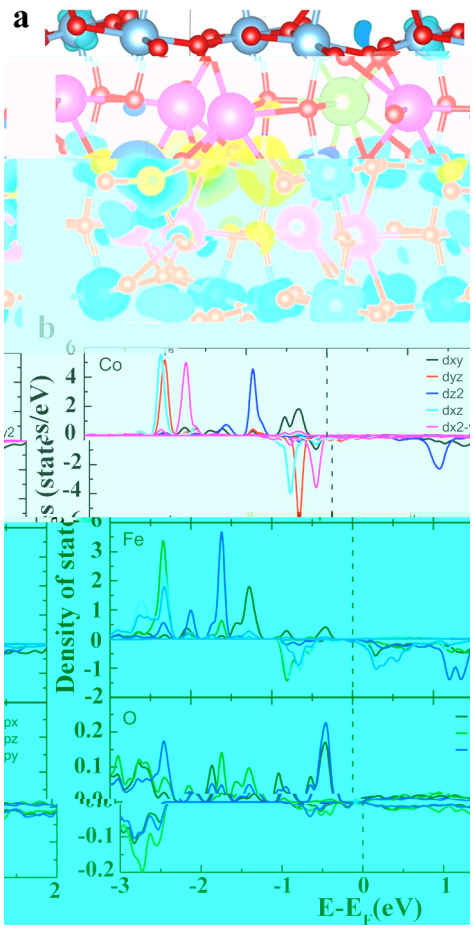

FIG. 3. ( ) t t tm (=0.005) ( ), {), ( ), (t), ( ), ( ) tm . ( ) t t t t t t t 3+ 3+.

. . N . I F . 4, A (0 1 20) . , 2 . F (2 < H < 5), , 2 , M H F . 2( ) 3. F , F 5 BLBFC P F M 399 O . PFM BLBFC , F . 5( ). A F -

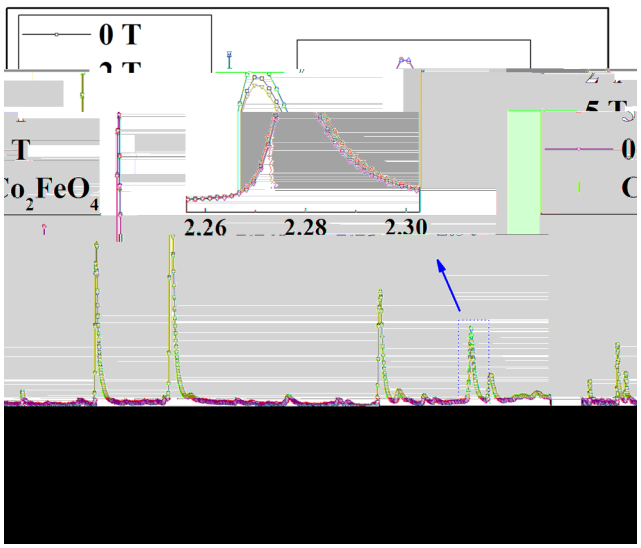

FIG. 4. [illegible] (0, 2, 5, [illegible], 0).

[illegible] C- [illegible] ([illegible]) [illegible] +2000 O F . 5( ). [illegible] −2000 O [illegible] F . 5( ). ([illegible]) [illegible] C 2F O4 [illegible] P [illegible] A BLFC [illegible]. G [illegible] (P) [illegible] 100 [illegible] (M) [illegible] 010 , [illegible] ([illegible]

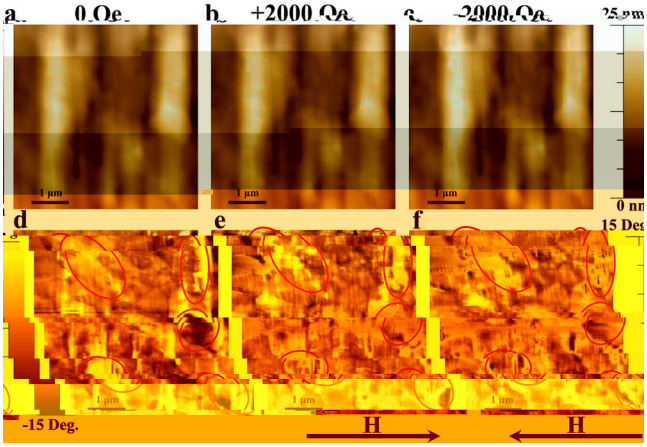

FIG. 5. [illegible] (' [illegible]). ( ) [illegible] t 0, ( )t, [illegible] t +2000, ( ) t, [illegible] t −2000, .

) [illegible] $T = P \times M$ [illegible] BLFC [illegible]. I , A [illegible] BLFC [illegible] [illegible]. F [illegible] F 3+ O F 3+, C 3+ O C 3+, [illegible] F 3+ O C 3+ [illegible] [illegible]. [illegible] A [illegible] , C /F [illegible] [illegible] EM [illegible] (ED) , [illegible] BLFC [illegible].

[illegible] D . Ma , Pa [illegible] D . K [illegible] , D. D [illegible] I H [illegible] I I N [illegible] , AL, D , O , K. [illegible] A [illegible] E D F , G [illegible] A [illegible] A [illegible] (G [illegible] N . 2/0038/20), C (G [illegible] N . K2015-0602006), [illegible] N FC (G [illegible] N . 11474138 [illegible] 11834005). A [illegible] E [illegible] M [illegible] P [illegible] (EM P) P IND54 Na [illegible]. EM J P EM P [illegible] E AME [illegible] E [illegible] J .

DATA AVAILABILITY

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

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