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AFFILIATIONS

[1]G _ I ᴜ , C f G f , ᴜ 430074, C
[2]I ᴜ f M , _ A _ f , _ 47, K 04001, _
[3] f E f M , ᴜ M , _ f L , L E1 4N , K f _
[4]N K L _ D I ᴜ F ᴜ , C A _ f E , M 621900, C
[5]N L , H _ , 11 0L , K _
[6]E L , F _ , ᴜ G 9 9 , K _
[7] f , L ᴜ _ , L ᴜ 730000, C

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ABSTRACT

M . H , - A , D . H , A $B_{5.25}La_{0.75}F$ C $_3O_{18}$ 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 $_3O_{15}$ (=4) B_6F_2 $_3O_{18}$ (FM) (=5), B_4 $_3O_{12}$, , , BFO_3, FE FM .[12,13] B - , .[1–4] H , - C F B- , $B_5F_{0.5}C_{0.5}$ $_3O_{15}$ (=4) B_6FC $_3O_{18}$ (=5) .[5] , - A $(B_2O_2)^{2+}(A_{-1}B$ $O_{3\ +1})^{2-}$ (A -, -, 12- - , B - ,) .[6] .[14,15] H , D - B- A BFO_3 - .[7–11] .[16] , - .

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

F 1 - (D) BLFC . A B2cb - A , A2$_1$, A . [19,20] B2cb $a = 5.4530(2)$ A, $b = 5.4427(1)$ A, $c = 50.670(2)$ A - A2$_1$am $a = 5.4651(6)$ A, $b = 5.3943(6)$ A, $c = 41.487(2)$ A F (:// . .).

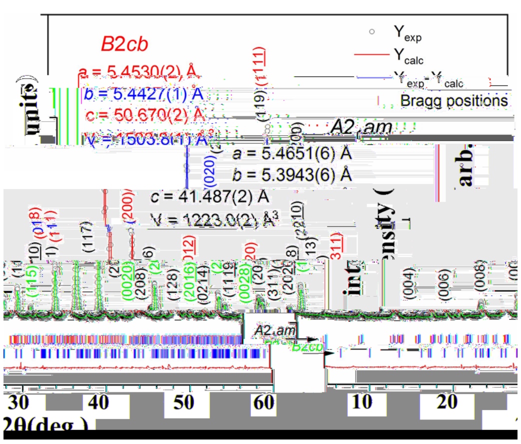

FIG. 1. -

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

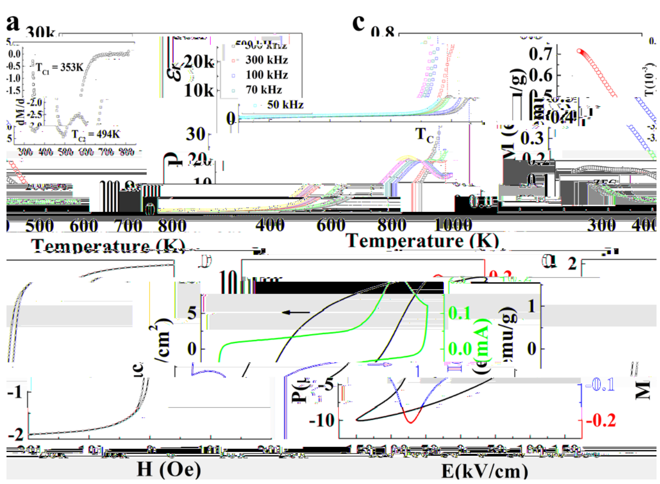

FIG. 2. ( ) = 200 . ( ) 300

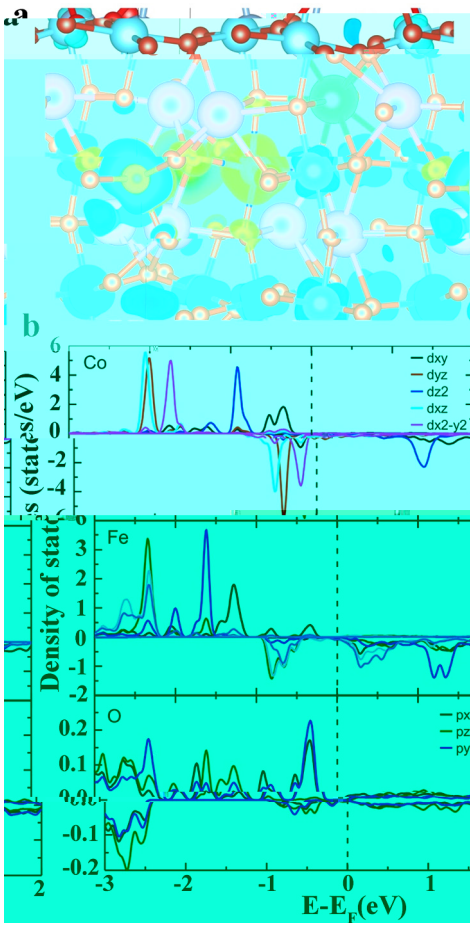

FIG. 3. ( ) t t tm (=0.005) ( ), {), ( ), (t), ( ), ( ) tm . ( ) t t t t t t t 3+ 3+.

. 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 -

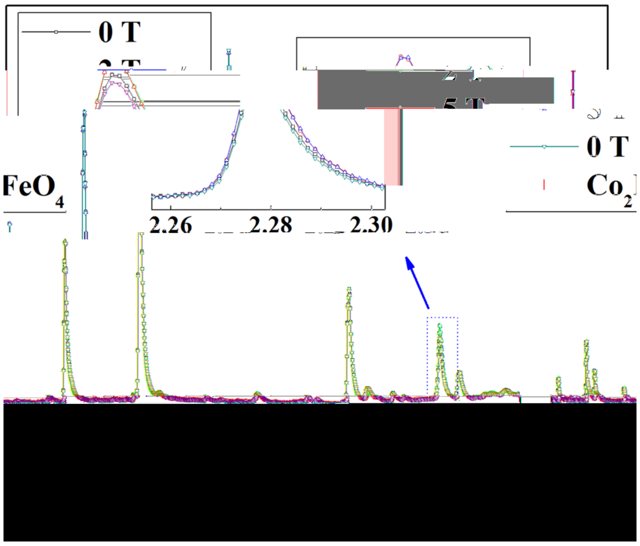

FIG. 4. ... (0, 2, 5 ... 0).

C - ( ) +2000 O F . 5( ). −2000 O F . 5( ). C $_2$F O$_4$ ... P A BLFC . G (*P*) 100 (*M*) 010 ...

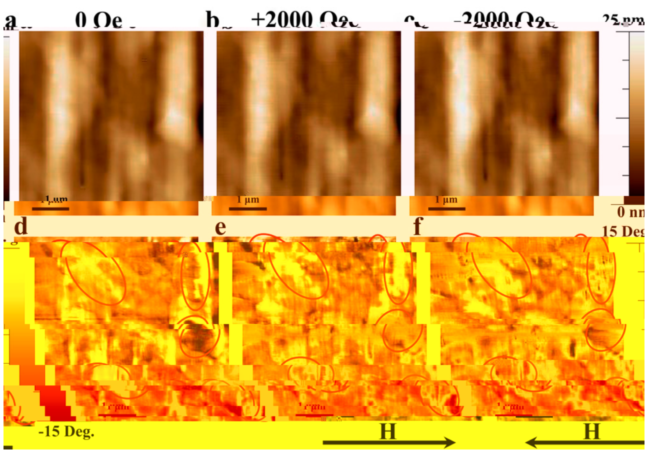

FIG. 5. ... ( ) 0 ( ) ( ) +2000 ( ) ( ) −2000 .

) $T = P \times M$ BLFC . I , A BLFC . F F^{3+} O F^{3+}, C^{3+} O C^{3+}, F^{3+} O C^{3+} ... A , C /F ...

EM - (ED) , BLFC .

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

DATA AVAILABILITY

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