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AFFILIATIONS

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

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[b)]Author to whom correspondence should be addressed: @ i .

ABSTRACT

M
. H , -
. , - A
,
D . H , A $B_{5.25}L_{0.75}FC_3O_{18}$
.
A , *in situ*
F $^{3+}$ O F $^{3+}$, C $^{3+}$ O C $^{3+}$, F $^{3+}$ O C $^{3+}$ - .
. A , C /F -
, - .

M (FE) A $B_5FC_3O_{15}$ (=4) $B_6FC_3O_{18}$ (=5), $B_4C_3O_{12}$ (FM) , , BFO_3, FE FM .[12,13] B - , . [1 4] H , - C F B- , $B_5F_{0.5}C_{0.5}C_3O_{15}$ - (=4) $B_6FC_3O_{18}$ (=5) .[5] , - A $(B_2O_2)^{2+}(A_{-1}B_{}O_{3+1})^{2-}$ (A -, .[14,15] H , -, 12- - , B - , D -)[6] .[16] , - B- - A BFO_3 - .[7 11] .

I , A B $_{5.25}$L $_{0.75}$F C $_{3}$O$_{18}$ (BLFC) ( ). L C , [14,17] D F , A a b , BLFC a b A , [18]

A , in situ I H I I N , AL, D , O , UK. F). , A 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 (:// . .).

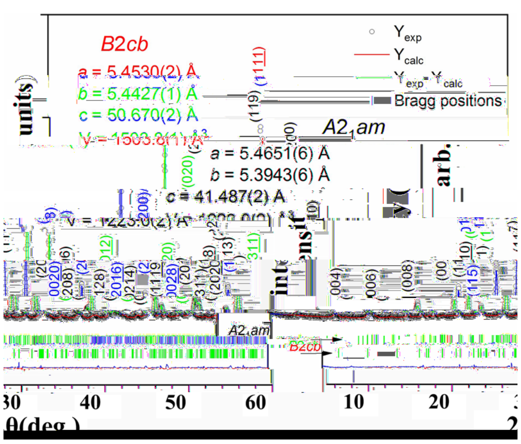

FIG. 1. -

BLFC A . N = 4 = 5 D' . F 1 EM BLFC . (a–b) . M , F . 1 1.4 . %, D. ED (F . 2 1) F , C , O, , C $_2$F O$_4$. A B $_5$F $_{0.5}$C $_{0.5}$ $_3$O$_{15}$.[16] F 2( ) BLFC (50, 70 100, 300, 500 H). 1060 K FE T BLFC . H , BLFC B $_6$ $_3$F $_2$O$_{18}$ (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

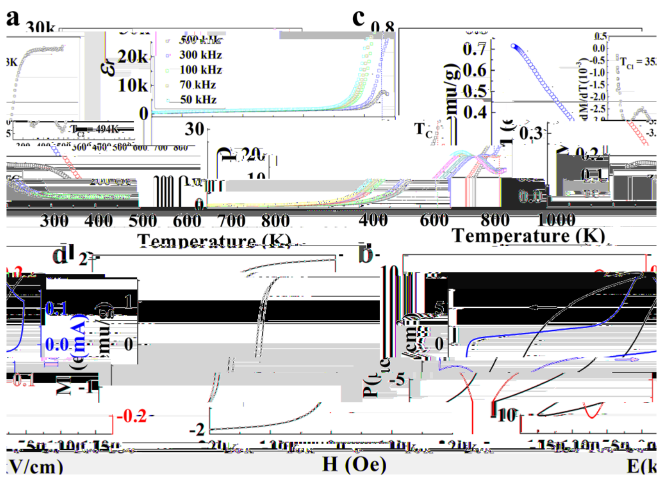

FIG. 2. ( ) = 200 ( ) 300

$_1 \sim 494$ K
(M/),
B $_6$F C $_3$O$_{18}$ (526 K).[23]
BLFC
F $^{3+}$ O F $^{3+}$, C $^{3+}$ O C $^{3+}$, F $^{3+}$ O C $^{3+}$ (.
).[24]
ED .
A FC $_2 \sim 353$ K
C $_2$F O$_4$. $_2$
C $_2$F O$_4$ (460 K) .[16,25]
(M) C $_2$F O$_4$
16 23.5 / .[25] , 1.4 . %
C $_2$ F O$_4$ 0.22 0.32 / ,
BLFC
M = 1.85 / , F . 2( ). I
, M H
$_1$
$_2$ (F . 3).
425 K 1.58 / .
0.27 / ,
ED
. , BLFC
A .
F 3
F $^{3+}$ O C $^{3+}$
(DF) *ab initio*
(A) . H
$_F$ = 2 $_C$ = 3 F C , ,
(GGA)+ . I
BLFC
F . 3( ) , F $^{3+}$ C $^{3+}$ (3.1 2.1 μ_B/ ,),
O
(0.1 μ_B/).
F O$_6$ C O$_6$
( ) F /C
F O / . F . 3( ) .
F ,
F $^{3+}$ C $^{3+}$,
(. .,) (. .,
) , .
, $E_{FM} - E_{AFM}$
= −144.1 .
H , . (FM)
43.5 (. ., 504.6 K), FM
$_1$ FC/FC . F . 2( ) .
a b
. ,
0 0 .
F 4
BLFC . I
- , - ,

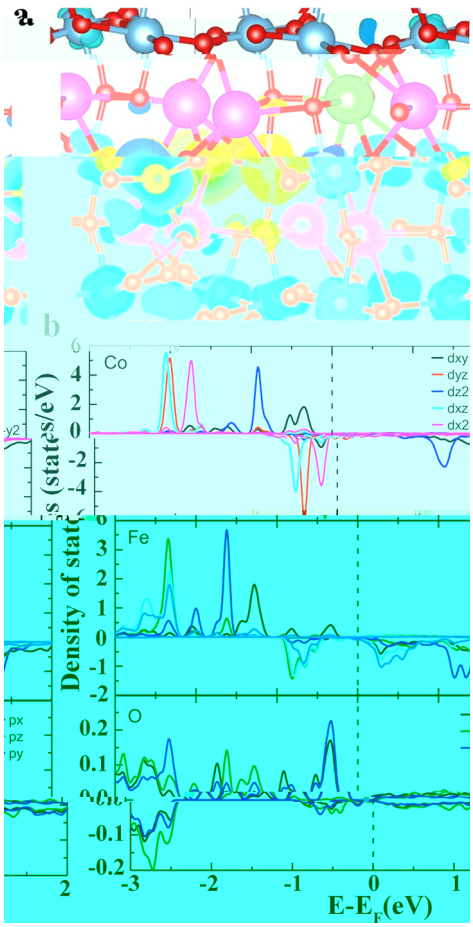

FIG. 3. ( ) t t tm (= 0.005) ( ), {), ( ), (t), ( ), ( ) tm . ( ) t t t t t t t t 3+ 3+.

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

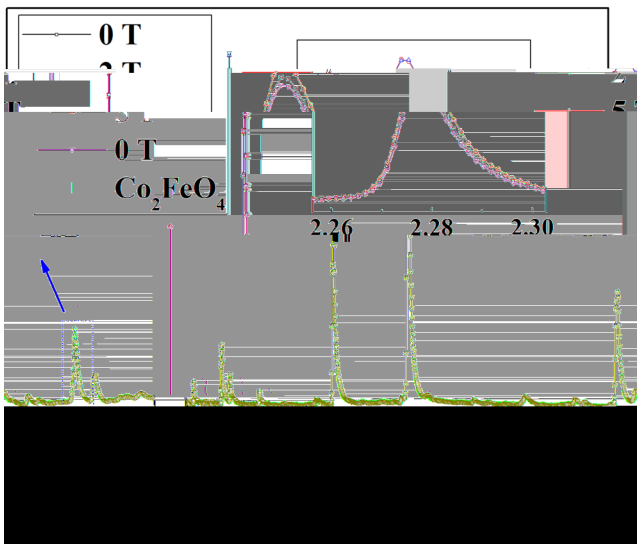

FIG. 4. [illegible]

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

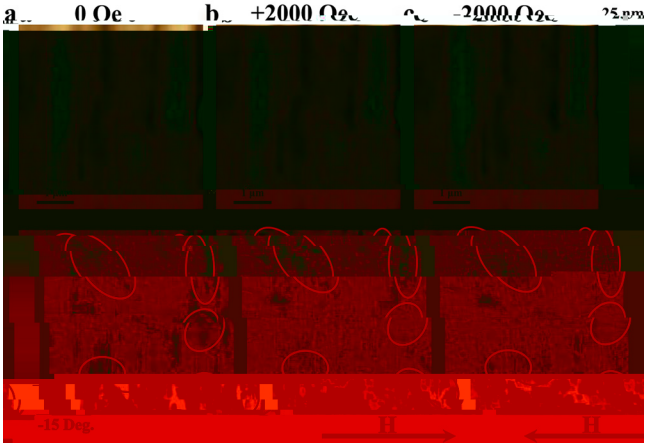

FIG. 5. [illegible]

) $T = P \times M$ 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 . M , D . K , D. D I H I I N , AL, D , O , UK.

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 (EM) IND54 N . EM EM E AME E .

DATA AVAILABILITY

.

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