

Inducing Crystallinity of Metal Thin films with Weak Magnetic Fields without Thermal Annealing

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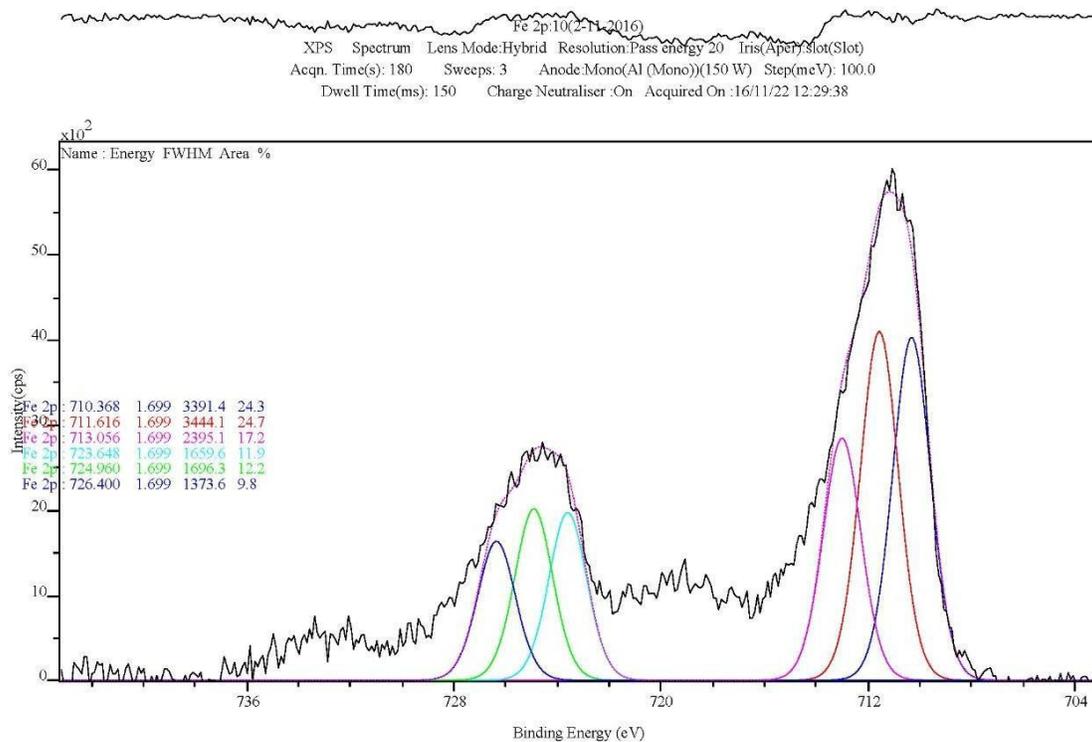
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Figure S1. XPS. First two conditions, thin film samples were tested first with GIXRD, and then after 3 weeks tested with XPS

Condition one: Thin film prepared inside 0.4T mag. field, under nitrogen atmosphere

Peak	Type	Position BE (eV)	FWHM (eV)	Raw Area (cps eV)	RSF	Atomic Mass	Atomic Conc %	Mass Conc %
Fe 2p	Reg	711.200	5.003	429350.0	2.957	55.846	20.82	50.40
O 1s	Reg	530.200	3.248	212480.0	0.780	15.999	40.39	28.01
C 1s	Reg	285.200	2.481	64290.0	0.278	12.011	36.80	19.16
Si 2p	Reg	102.200	2.456	4285.0	0.328	28.086	2.00	2.44

Table 1. Composition of iron phase, prepared at 0.4 T. of condition one.



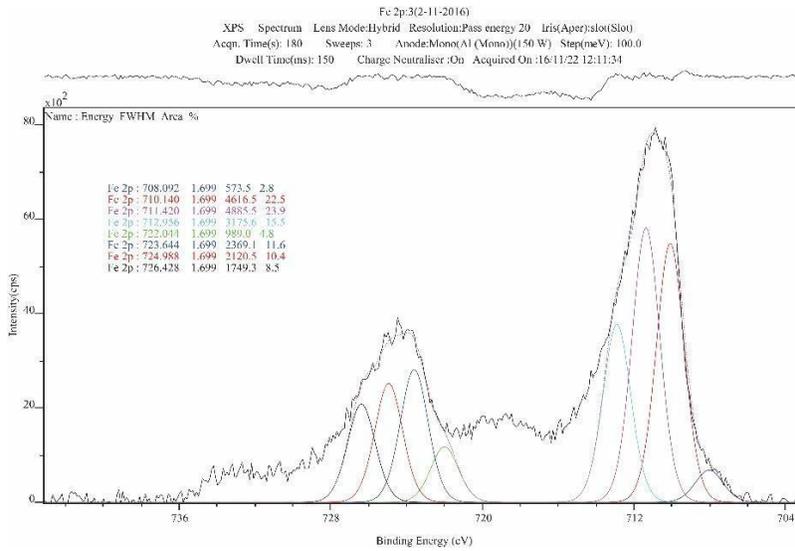
Peaks of Fe 2p

Condition two: thin film prepared by sparking of iron wire in 0.2T mag. field, under nitrogen atmosphere.

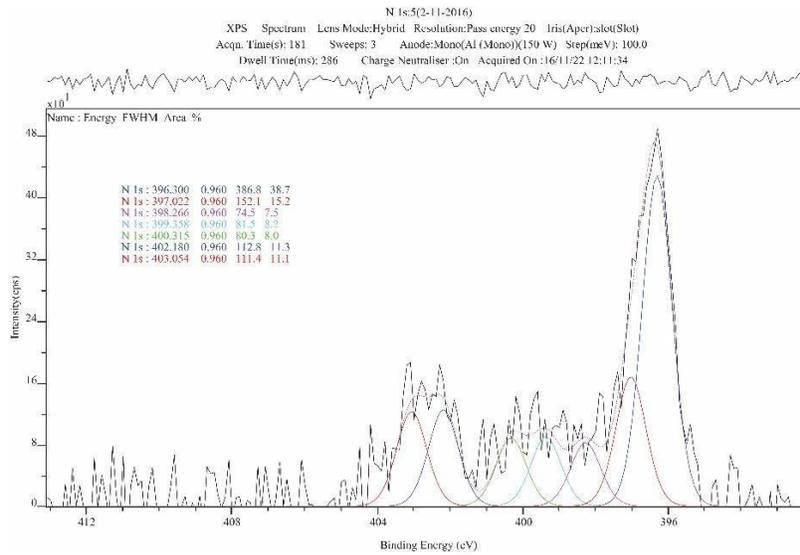
State : Angle Name : Position 1

Peak	Type	Position BE (eV)	FWHM (eV)	Raw Area (cps eV)	RSF	Atomic Mass	Atomic Conc %	Mass Conc %
Fe 2p	Reg	711.100	5.007	557670.0	2.957	55.846	23.14	54.27
O 1s	Reg	530.100	3.286	225790.0	0.780	15.999	36.73	24.68
N 1s	Reg	396.100	2.198	9230.0	0.477	14.007	2.52	1.48
C 1s	Reg	285.100	2.456	75595.0	0.278	12.011	37.02	18.68
Cl 2p	Reg	198.100	2.247	3990.0	0.891	35.460	0.59	0.89

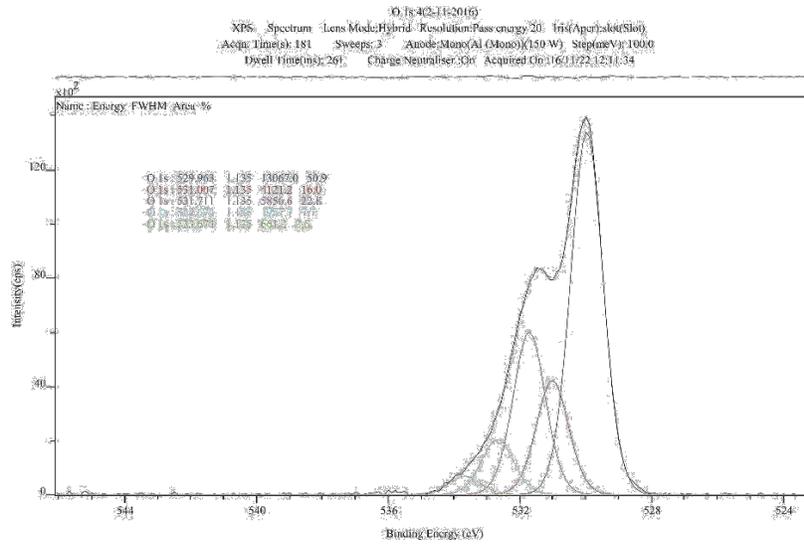
Table 2. Elementary composition of iron thin film prepared at 0.2T of condition two.



Peak of Fe 2p. Condition two of SI Figure 1



Peak of N 1s. Condition two of SI Figure 1.

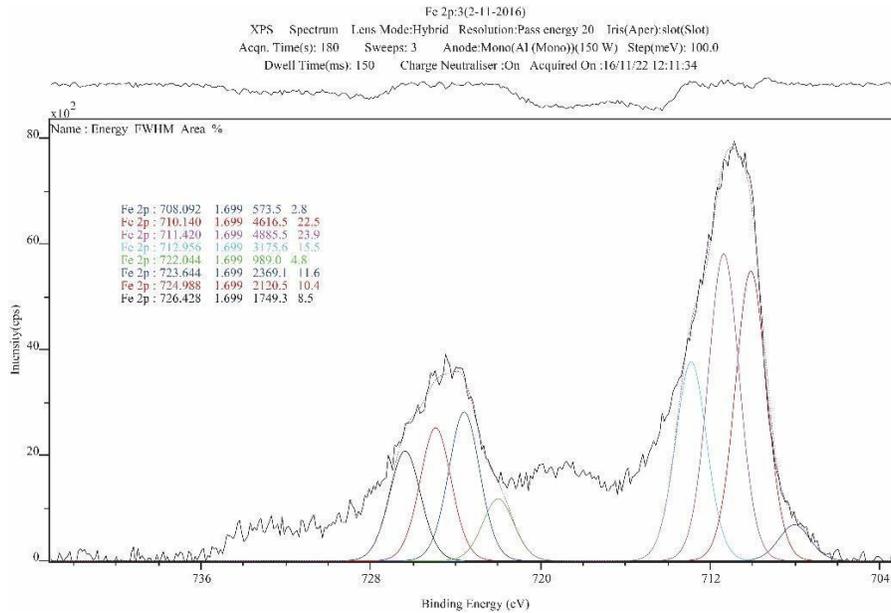


Peak of O 1s. Condition two, Figure 1 of SEI

Condition 3: Thin film substrate prepared by sparking in 0.4 T for FESEM characterization

Peak	Type	Position BE (eV)	FWHM (eV)	Raw Area (cps eV)	RSF	Atomic Mass	Atomic Conc %	Mass Conc %
Fe 2p	Reg	711.200	4.275	264650.0	2.957	55.846	13.45	24.55
O 1s	Reg	531.200	3.592	153910.0	0.780	15.999	30.66	16.03
C 1s	Reg	285.200	2.321	73310.0	0.278	12.011	44.00	17.27
Si 2p	Reg	102.200	2.144	12715.0	0.328	28.086	6.23	5.72
Au 4f	Reg	84.200	1.631	223415.0	6.250	196.967	5.66	36.43

Table 3. Composition of substrate prepared by condition three.



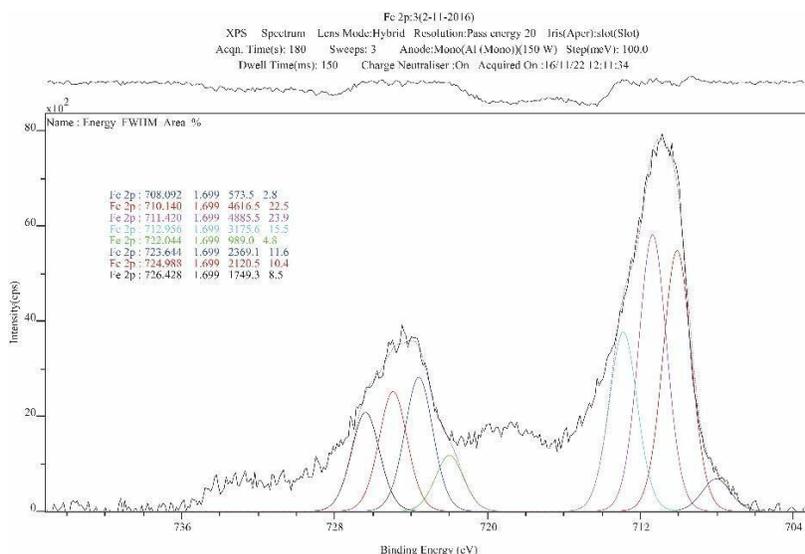
Iron peak of condition three

Condition 4. Sample prepared by sparking of iron wire at 0.2 T and aged for 90 days at ambient conditions.

Elementar composition

Peak	Type	Position BE (eV)	FWHM (eV)	Raw Area (cps eV)	RSF	Atomic Mass	Atomic Conc %	Mass Conc %
Fe 2p	Reg	711.200	5.207	757010.0	2.957	55.846	23.92	55.65
O 1s	Reg	530.200	3.247	282370.0	0.780	15.999	34.98	23.31
N 1s	Reg	396.200	2.463	27140.0	0.477	14.007	5.65	3.30
C 1s	Reg	285.200	2.305	95050.0	0.278	12.011	35.45	17.74

Table 4 of condition four

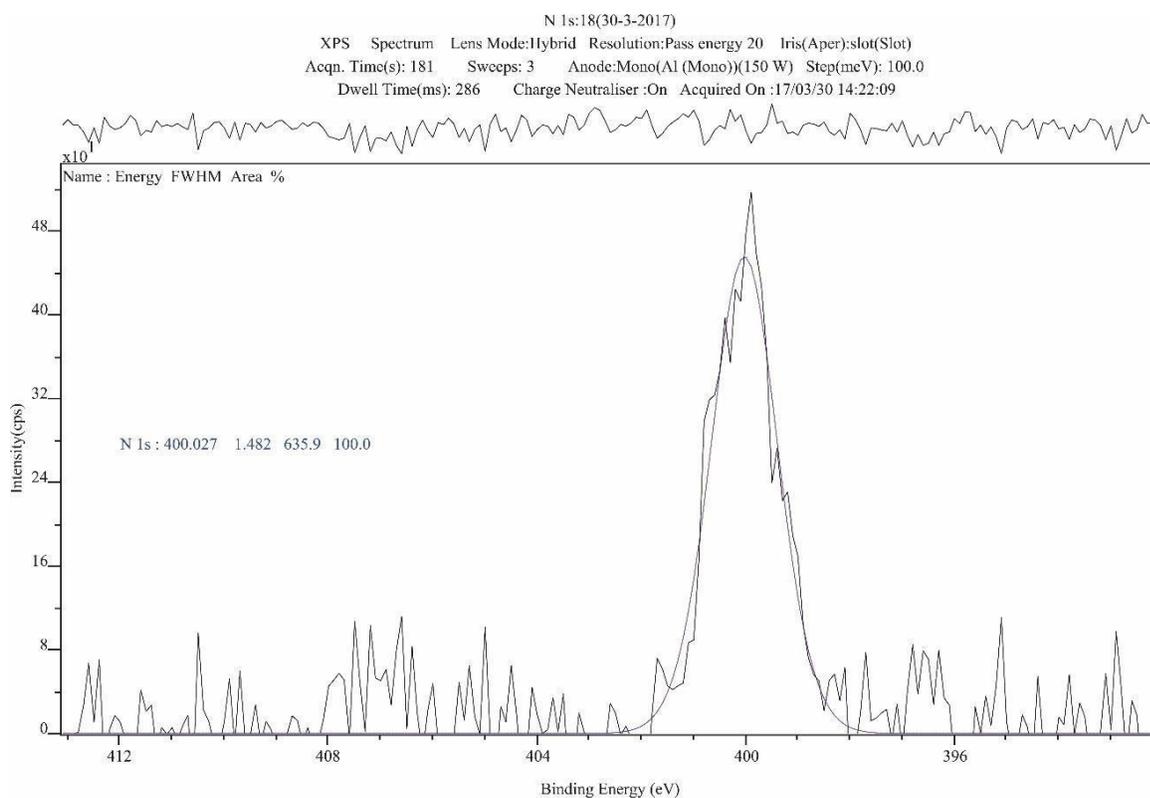


Peak of Fe 2p of Condition 4.

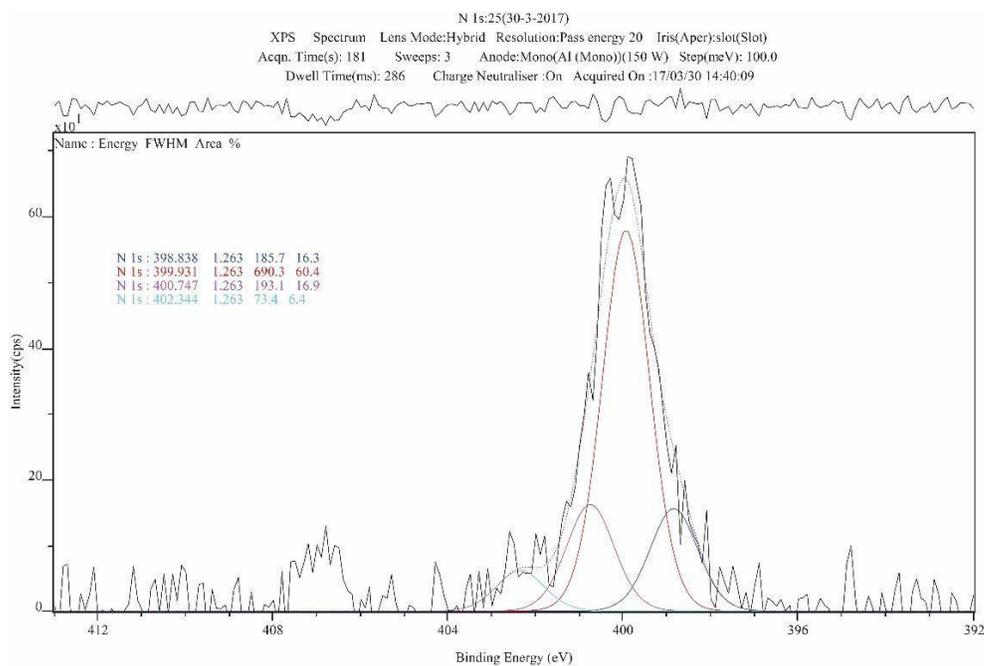
Peak of N 1s of condition 4.

Figure S2. Supporting information for Table 1. of manuscript.

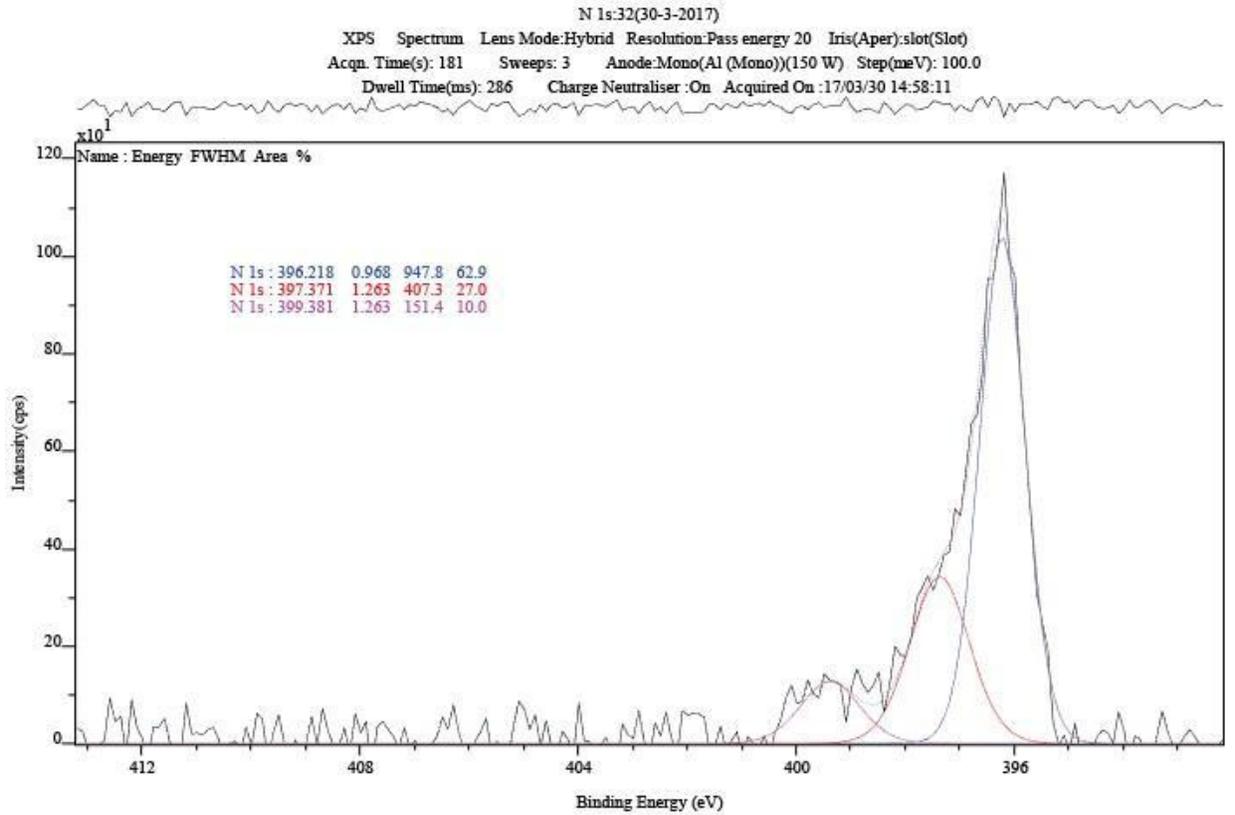
Condition one: N 1s peak of sample prepared by sparking inside of 0.1T, freshly prepared



Condition two: N1s peak of sample prepared by sparking inside of 0.2T



Condition 3: N1s peak of sample sparked in 0.3T



Condition 4. Iron wire sparked under flowing of nitrogen gas, without presence of magnetic field. Peak of N 1s represented.

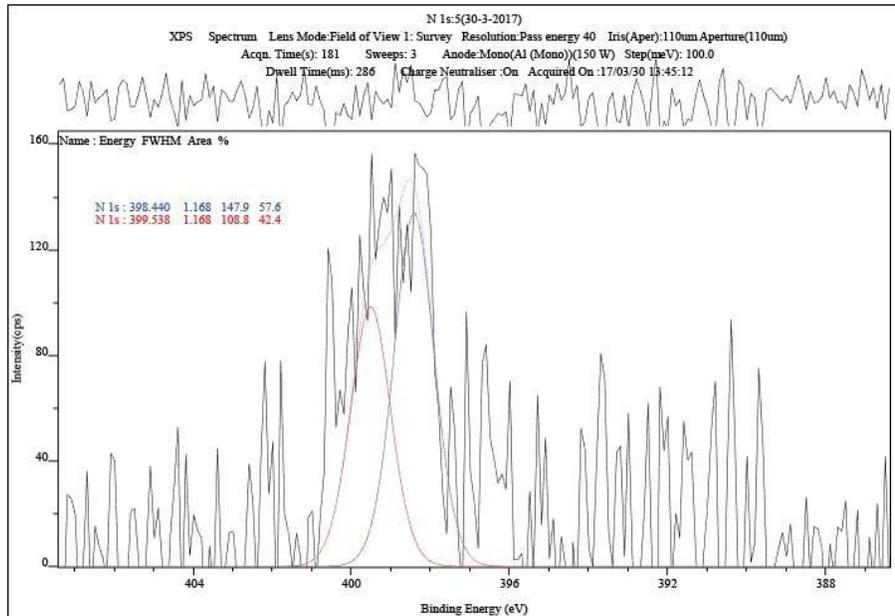
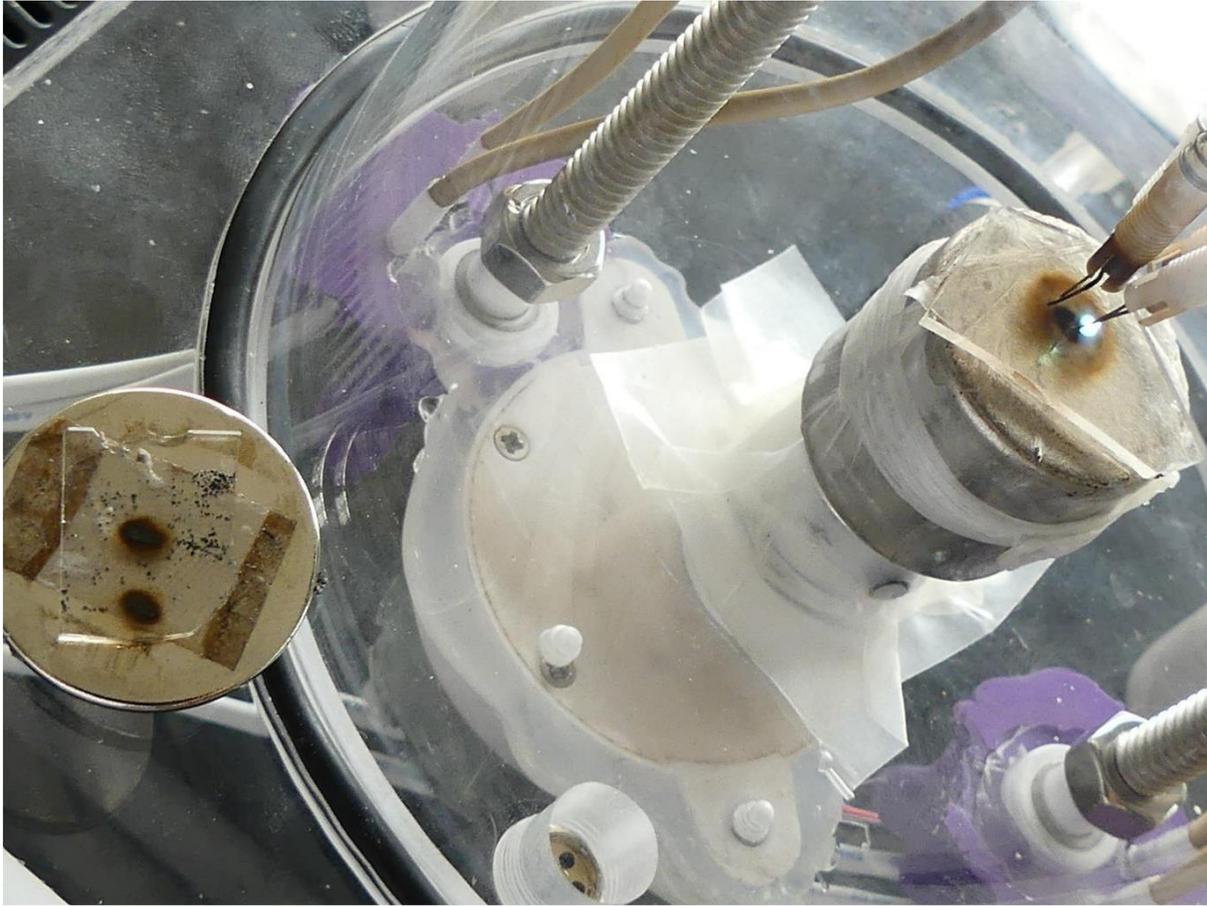
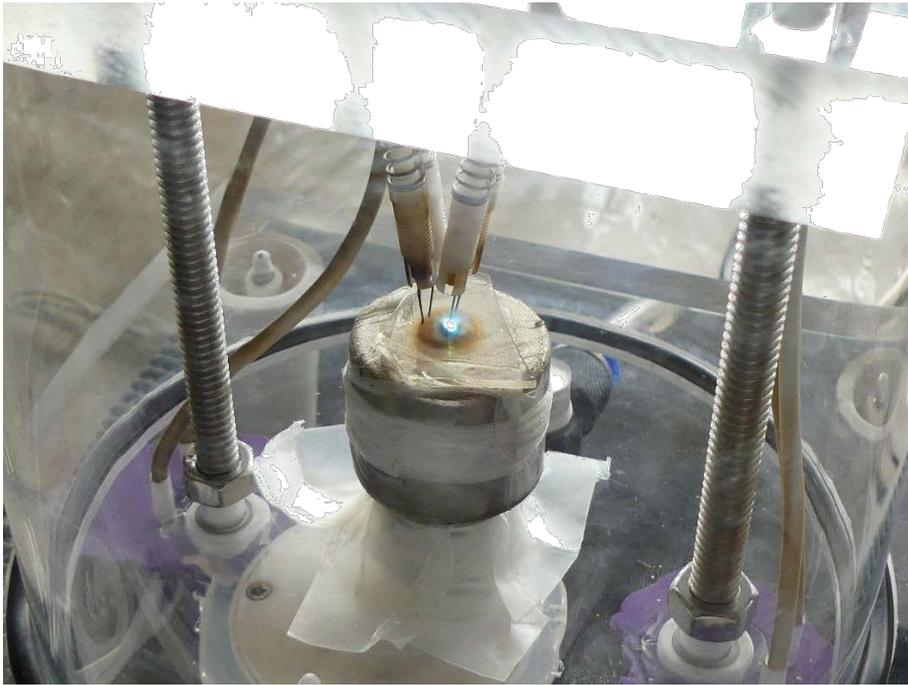
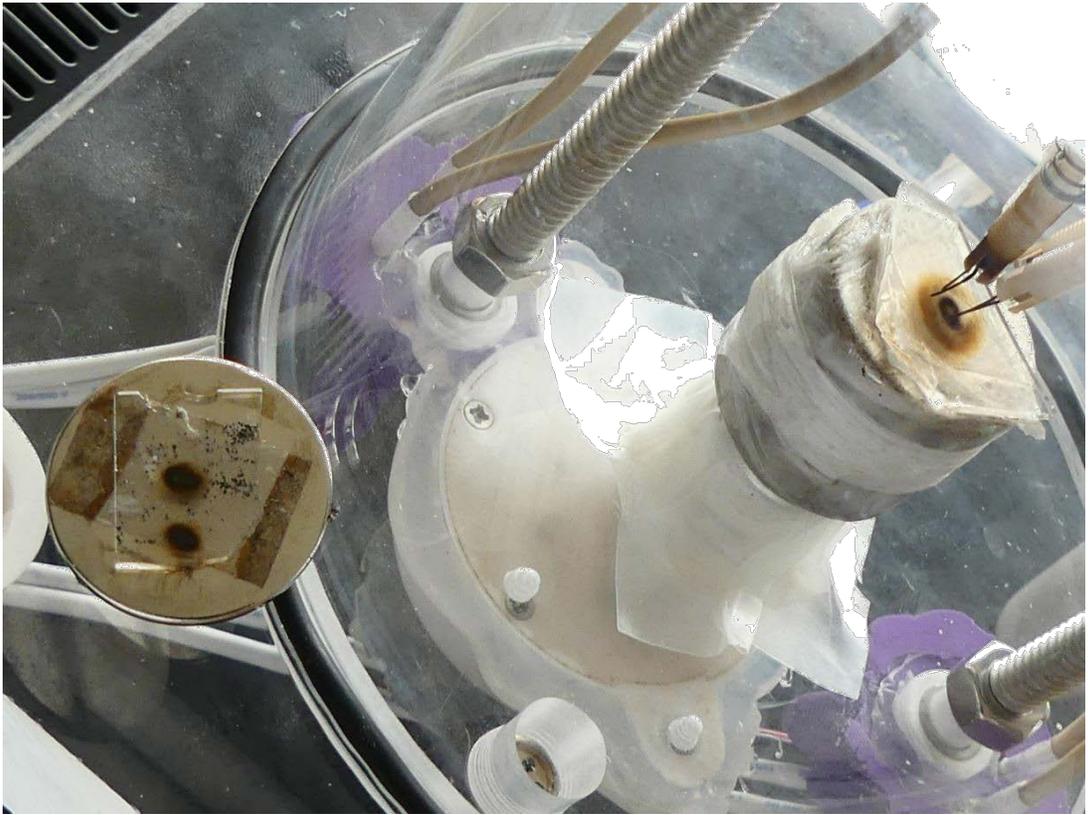


Figure S3. of Supporting Information Pictures of thin film prepared in sparking chamber.



Picture 1 comparison substrate prepared at 0.2T (outside of chamber) on discoid magnets and 0.4T (inside chamber, beneath sparking head) permanent magnet



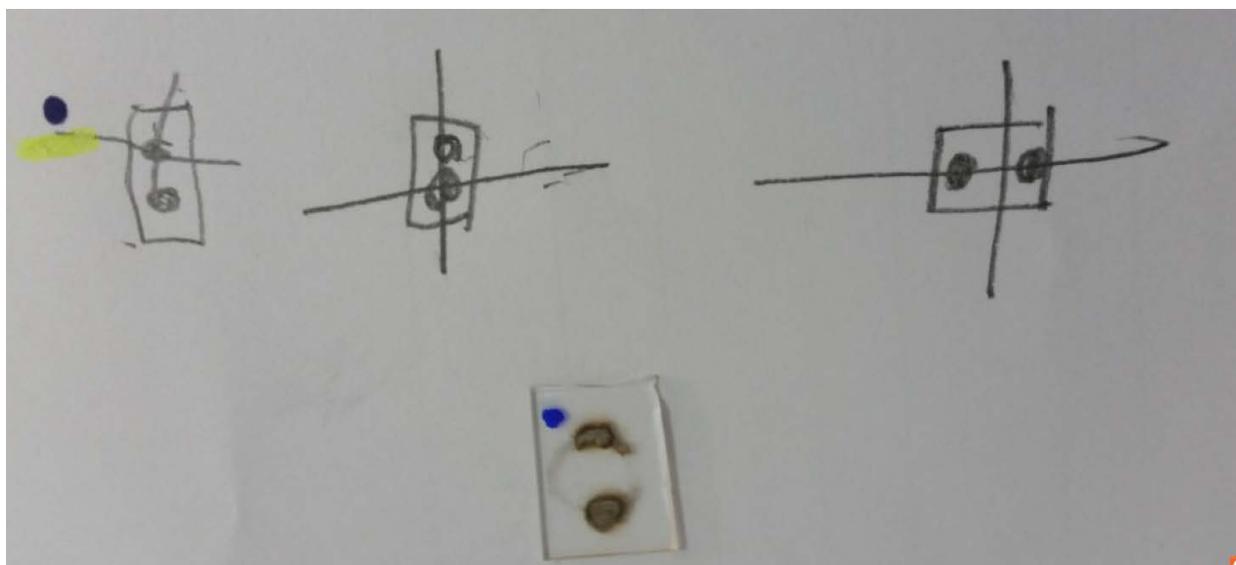


Figure S4. Picture of quartz substrate with indium thin film, blue dot depicted position of center. Graphical representation of 3 GIXRD measurements.

Reference

1. Ručman, S.S.; Punyodom, W.; Jakmunee, J.; Singjai, P. Novel strategy for longevity prolongation of iron-based nanoparticles thin film by applied magnetic force. Available online: <http://www.rsc.org/suppdata/c7/nj/c7nj04730d/c7nj04730d1.pdf>