Lin Li

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Summary Statement

Growth and comprehensive characterization of complex oxide thin film to explore potential application; Microscopic characterization of advanced functional materials; Utilization of microfabrication technique to fabricate in-situ TEM device to reveal physical process microscopically; In-situ technique (TEM, XRD) to research phenomena associated with structure and external stimulus such as electric field and temperature.

Education

Institute of Physics, Chinese Academy of Sciences, China

Ph.D, Condensed Matter Physics, Advisor: Jiandong Guo 09/2008-01/2014

Louisiana State University, USA

Visiting student, Advisor: Jiandi Zhang 06/2012-07/2013

Harbin Institute of Technology, China

B.E., Material Moulding and Control Engineering 09/2004-07/2008

Skills

Film Deposition: PLD, Oxide-MBE, Thermal Evaporation

Microfabrication: UV Lithography, E-Beam, FIB, RIE, ICP

Surface Characterization: STM, XPS, LEED, SEM

Structure Characterization: TEM/in-situ, XRD/in-situ

Property: PPMS, SQUID, Probe-Station, I-V

Software: AutoCAD, Solidworks, Diamond, L-Edit

Synthesis: Hydrothermal Fabrication, Solid State Synthesis, Box and Tube Furnace

Research Experience

Visiting Student, Louisiana State University, United States *07/2012-07/2013*

Research of properties of $La_{2/3}Sr_{1/3}MnO_3$ ultrathin film

Growth of $La_{2/3}Sr_{1/3}MnO_3$ thin films on $SrTiO_3$ (110); Investigated oxygen stoichiometry, thickness and interface effect on transport and magnetic properties of $La_{2/3}Sr_{1/3}MnO_3$ thin films; Determined surface stoichiometry of $La_{2/3}Sr_{1/3}MnO_3$ thin film by using Angle-resolved XPS; Different effects such as crystalline orientation, polar discontinuity, stoichiometry and interface effect on dead layer were systematically investigated; Strongly enhanced conductivity and reduced thickness of dead layer by 3 u.c. were realized by introducing $LaMnO_3/La_{2/3}Sr_{1/3}MnO_3$ interface.

Investigation of reentrant insulating phase in $La_{2/3}Sr_{1/3}MnO_3$ ultrathin film

Discovered reentrant insulating phase at low temperature in $La_{2/3}Sr_{1/3}MnO_3$ ultrathin film and revealed that disorder induced localization causes such phenomenon.

Treatment of $SrTiO_3$ (110) surface

Achieved phase diagram of $SrTiO_3$ (110) surface reconstruction due to thermal annealing and method to reversibly control surface reconstructions between 3×1 and 4×1.

Research Assistant, Institute of Physics, Chinese Academy of Sciences *09/2008-06/2012*

Growth and characterization of Au nanoparticle on atomically resolved 4×1 $SrTiO_3$ (110) surface

Grew Au on 4×1 reconstructed $SrTiO_3$ (110) surface; Revealed effect of 4×1 reconstruction on nucleation and thermal stability of Au nanoparticle by STM.

Homoepitaxial growth of $SrTiO_3$ thin film on $SrTiO_3$ (110) substrate by Oxide-MBE

Homoepitaxial growth of $SrTiO_3$ by Oxide-MBE; Precisely controlled cation stoichiometry by using feedback from surface reconstruction through RHEED.

Treatment of $SrTiO_3$ (110) surface

Investigated effect of surface cation stoichiometry on surface reconstruction of $SrTiO_3$ (110); Controllable surface structures were achieved by tuning surface Sr/Ti ratio via Ar+ sputtering/annealing or Sr and Ti deposition with MBE.

Synthesis of $Na_{0.44}Mn_2O_4$ and $LiMn_2O_4$ ultrathin nanowires for lithium ion battery

Synthesized $Na_{0.44}Mn_2O_4$ ultrathin nanowires by hydrothermal fabrication; Revealed microscopic formation mechanism of $Na_{0.44}Mn_2O_4$ nanowire by XRD, SEM and TEM; Synthesized $LiMn_2O_4$ nanowire by using $Na_{0.44}Mn_2O_4$ template.

Investigation of structure of $K_{0.4}Fe_{0.8}Se_2$ with in-situ Temperature & Electric-field XRD

Characterized structure evolution of $K_{0.4}Fe_{0.8}Se_2$ superconductor parent compound with varying temperature and under electric-field; Electric field induced structure change was found and joule heating was excluded.

Assisted organization of 4th APCTP Workshop on Multiferroics (2012) at Institute of Physics

Engineering Experience

Built up a two-probe station for measurement of electrical properties of devices.

Designed a TEM specimen holder for applying electric field on specimen inside TEM.

Designed and built up a precise grinding polisher for TEM specimen preparation.

Developed a special SiN_x window for in-situ TEM sample support.

Designed and fabricated in-situ TEM devices on SiN_x thin film window with microfabrication technique, such as optoelectrical CdS nanowire device integrated with LED, Cu electromigration nanodevice.

Built up a mobile heater for PLD thin film growth and in-situ characterization.

Publications

Lin Li et al., Splitting process of Na-birnessite nanosheet via transmission electron microscopy, Chin. Phys. Lett. 30, 088103 (2013).

Lin Li et al., Reentrance of insulating phase of $La_{2/3}Sr_{1/3}MnO_3$ (110) thin film at low temperature, to be submitted.

Lin Li et al., The dead layer of $La_{2/3}Sr_{1/3}MnO_3$ film with different crystalline orientation, in preparation.

Lin Li et al., Effect of surface capping on properties of $La_{2/3}Sr_{1/3}MnO_3$ (110) ultrathin film, in preparation.

Y. L. Yang, C. L. Yin, **Lin Li**, Z. S. Lu, J. Ma, Z. H. Jiang, Hydrothermal synthesis and crystal structure of a one-dimensional inorganic-organic hybrid material [Ni(2,2'-bipy)2] V_2O_6, Journal of Synthetic Crystals, 36, 825(2007).

Y. L. Yang, C. L. Yin, Z. S. Lu, J. Ma, **Lin Li**, Z. H. Jiang, Hydrothermal synthesis and crystal structure of the chiral large microporous gallophosphate Hit-5, Journal of Synthetic Crystals, 36, 311 (2007).

Y. L. Yang, Y. Gao, X. R. Liu, **Lin Li**, Z. H. Jiang, Self-assembly and crystal structure of microporous fluorogallophosphate $Ga_3P_3O_{12}F{\cdot}0.5(1,8\text{-}C_8H_{22}N_2)$ under hydrothermal conditions, Journal of Synthetic Crystals, 36, 10435 (2007).

Patents

Lin Li et al., Process for manufacturing novel TEM sample supporting film (silicon nitride window), Identifying No.101794694 A.

Lin Li et al., A Process for manufacturing thin film window, Appl. No. 2013105753169.

Z. L. Liao, **Lin Li**, D. M. Chen, Manual precise grinding polisher for preparing TEM sample, Identifying No. 201537844 U.

Honors and Awards

Honor of Excellent Poster in Fall Meeting of Chinese Physics Society	2013
Honor of Magna Cum Laude graduate	2008
Excellent undergraduate thesis for B.E. degree	2008
First prize award of People's Scholarship	Fall, 2007
First prize award of People's Scholarship	Spring, 2007
Yatong outstanding scholarship	2006-2007
Second prize award of outstanding science innovation	2006-2007
Excellent league member Award	2006-2007
Second prize award of People's Scholarship	Fall, 2006
"Triple-A" outstanding student	2005-2006