SIZHAO (FOX) HUANG

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LIST of PUBLICATIONS

1. Mao Ye, **Sizhao Huang**, Yuewen Fang, Hua Zhou, Weiwei Wei, Peng Lin, Chuanwei Huang, Shanming Ke*, Haitao Huang, Lang Chen, Xierong Zeng, Chun-Gang Duan, and Ying-Hao Chu*， *Artificial Interface Dipoles Enhanced Electroresistance in Ferroelectric Tunnel Junctions* (Submitted for Nature Communication in Nov 2016, the first two authors contributed equally to this work)

2. **Sizhao Huang**, Chuanwei Huang, Lang Chen*, *Atomic Engineering of Oxygen Octahedral Tuned Artificial Nanostructure in LSMO Superlattice* (Redraft for Advanced Functional Materials)

3. **Sizhao Huang**, Lang Chen*, *Eletrocaloric effects based on artificial engineered nanostructure* (Prepared for submitting to Journal of Applied Physics in late Dec. 2016)

4. F. Yen, **S. Z. Huang**, S. X. Hu, L. Y. Zhang, and L. Chen*, *Indirect observation of molecular disassociation in solid benzene at low temperatures* (Submitted for Physic Review Letter in Dec 2016)

5. Wu, Di, **Sizhao Huang**, Dan Feng, Bing Li, Yuexing Chen, Jian Zhang, and Jiaqing He. "Revisiting AgCrSe 2 as a promising thermoelectric material." Physical Chemistry Chemical Physics 18, no. 34 (2016): 23872-23878.

PATENTS

1. **Sizhao Huang**, L.K., Wentao Cheng, Yuli Lai, Yanping Xu, A method for preparing titanium nitride coated lithium titanate materials. **CN103400976B,** 2013, China, Authorized.

2. **Sizhao Huang**, Lang Chen, A method of manufacture full solid state cooling core functional element. **2016110289125,** 2016, China, Published, ready for inspection.

3. **Sizhao Huang**, Lang Chen, A full solid state cooling system based on electrocaloric effects. **2016110287204,** 2016, China, Published, ready for inspection.

4. **Sizhao Huang**, Lang Chen, A method of manufacture full solid state cooling core functional element. **201611016860X,** 2016, China, Published, ready for inspection.

EDUCATION

M.Sc. Degree in Materials Science (December 2010)
School of Materials, University of Manchester– *Manchester, UK*

Bachelor's Degree of Engineering (May 2009)
Department of Mechanical Engineering, University of Central Lancashire– *Preston, UK*

SKILLS and TECHNIQUES

- Growth of high quality of varies thin film using LMBE associates with RHEED. Capable of operating sputter.

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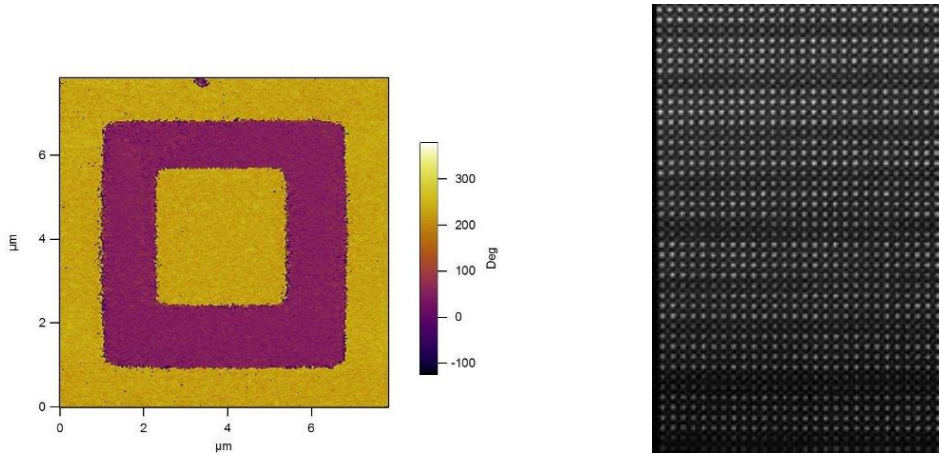

Figure 1. Fully electric-switched $BaTiO_3$ film with clearly identical boundaries. (Left) High-resolution TEM plot of $La_{0.7}Sr_{0.3}MnO_3$ superlattice (Right)

- Expertise in substrate desired terminal layer treatments. SrO or TiO layer for $SrTiO_3$, AlO or LaO layer for $LaAlO_3$ or LSAT and so forth.
- Experience of high density (96.7% $BiFeO_3$) target procedures.
- Experience X-Ray diffraction of thin film characterization as 2-Theta, XRR, RSM for instance.
- Hands on experience of electrics and magnetic transport measurements, such as 4-electrodes resistance, hall, and magneto-resistance measurements by applying PPMS system.
- Experience of AFM, along with PFM, EFM and MFM.
- X-ray diffraction experience in Shanghai Synchrotron Radiation Facility, follow by X-ray absorption spectroscopy in Beijing Synchrotron Radiation Facility and X-ray linear dichroism in Heifei National Synchrotron Radiation Laboratory.
- Applying Solidworks developed UHV vacuum level and extended an in-situ transfer suitcase. Fully being through LMBE system hardware maintenance, RHEED filament, baking, pump and so forth.
- Well data analysis and origin software experience.
- Fully experienced patent application and IEC process.

RESEARCH EXPERIENCE

Research Assistant and Lab technician at South University of Science and Technology of China-*Shenzhen, China* **-** Mar. 2014 till Present

- The negative Poisson ratio of LSMO superlattice
  The negative Poisson ratio was found more general than thought in changing valence transition metal oxides, this project was targeted to achieve super thin layered LSMO and clamping strained layer by cubic and tilted substrate in superlattice configuration.
  The more details are in the content of draft of awaiting for submitting.

- $LaTiO_3$ and $LaRaO_3$ (Ra stands for Rare earth transition metal element) superlattice
  The Ti^{3+} of $LaTiO_3$ (LTO) contains one t_{2g} electron suffered from electrons interaction which is a considerably Mott-insulator and weak anti-ferromagnetics. The project was aiming for the potential new emergence introduced by the charge transfer from LTO to $LaRaO_3$ or the opposite. This project is cooperate with Dr. Meng Wu in Xiamen University who was granted her Ph.D. degree in Max Planck Institute for Solid State Research. Her supervisor

and her team is specialized in $LaNiO_3$ and $LaTiO_3$ superlattice.
At the first stage, single layered LTO made by $La_2Ti_2O_7$ target was well studied along with varies strained substrate from $LaAlO_3$ to $KTaO_3$ under extremely high temperature (950℃) and complete vacuum condition to achieve the pure Ti^{3+} phase verified by XPS and furthermore, the XAS. The pure LTO figures was applied to fibrate and tune BTO tunnel junction associated with Dr. Mao Ye in Shenzhen University.
The second stage was meeting the bottleneck of growth criteria of LTO & $LaReO_3$ artificial heterostructures, the temperature and oxygen is not possible to produce a double layered superlattice due to no overlapping of each other condition, the solution was then came out by myself to deposited additionally with one protecting layer of $LaAlO_3$, in very special design sequence, the very desired epitaxial $LaReO_3$ and LTO interface was successfully achieved. The further characterization of the charge caused effect is awaiting for HR-TEM, HADDF and COBRA inspection.

- The multi-caloric effects project
  By applying Carnot thermodynamic cycle, series Maxwell partial differential equations are able to describe a cooling process based on multi-ferroics materials. Altering the external field like strains, electric or magnetic field, etc. I was triggered by Vopson, Melvin M etc. who completed the equation by introducing more than one field and concluded the enhanced effect of multiple fields' effects. I designed BTO growth on PMN-PT so that when electric field applied, PMN-PT is able to deliver strain into BTO film, compare with only one electric field.

- The assistance is full-time offered where the lab very necessities stands from the lab construction to 6 unique UHV chamber maintenances. Hands-on experience brought the truly understanding through equipment negation, purchasing and training, funding by the government partially applied by me along with other associates. **600, 000 RMB** funding in the first year and **2 million** the second year based my single person efforts to all application procedures and paperwork.

Research Team Leader at Shenzhen Dynanonic Co., Ltd – *Shenzhen,China* Sept 2011- Oct 2013

- By applying nano-technologies and materials science methods, developing discharge capacity of nano-scaled lithium titanium oxide spinel up to **168mAh/g** (170mAh/g in theory) whereas the rate capability is close to 150mAh/g at 2C. The electrochemical properties are better than other brands same materials commercial products such as ATL and Toshiba Scib.
- Fulfilled relevant patent application technology documents. One TiN coating on nanoscaled $Li_4Ti_5O_{12}$ method is on processing. **One Chinese patent** is now fully authorized.(**CN103400976A)**
- Proposed an IEC standard 62607-4-2 Cathode nanomaterial for lithium ion batteries for past two years as one of the experts group. The standard has been approved by 11 countries.
- The Nano-scaled lithium titanium oxide spinel materials for lithium ion batteries application project won the founding support by Shenzhen Nanshan District government in Aug 2012.

INTERESTS

Cycling, drawing, photography, travelling.

References available on request.