

# Shingo Toyoda

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## Education

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B.En. Department of Applied Physics, The University of Tokyo, 2012.

M.Sc. Department of Advanced Materials Science, The University of Tokyo, 2014.

Visiting Researcher, Professor Fiebig group, ETH Zurich, 2014.

Ph.D. Department of Advanced Materials Science, The University of Tokyo, expected 2017.

## Research Interests

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Multiferroics, Optical magneto-electric effect, Magneto optics

## Research Experience

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### Single Crystal Growth

- Floating zone melting method
- Flux method

### X-ray crystal structure analysis

### Optical measurements

- Photoluminescence
- Spectroscopy in high magnetic fields
- Second harmonic generation

### Exact diagonalization calculation

## Fellowships

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JSPS Research Fellowships for Young Scientists (DC1) 2014-2017.

Program for Leading Graduate Schools (MERIT), The University of Tokyo, 2012-2014.

## Awards

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Best Poster Award  
20th International Conference on Magnetism, Barcelona, 2015

Shoji Tanaka Award  
Master's Thesis Prize in Department of Applied Physics, The University of Tokyo

## Publications & Presentations

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### *Papers*

1. Gigantic directional asymmetry of luminescence in multiferroic  $\text{CuB}_2\text{O}_4$   
**S.Toyoda**, N. Abe, and T. Arima.  
 Submitted (arXiv:1602.08013)
2. One-way transparency of light in multiferroic  $\text{CuB}_2\text{O}_4$   
**S.Toyoda**, N. Abe, S. Kimura, Y. H. Matsuda, T. Nomura, A. Ikeda, S. Takeyama, and T. Arima.  
 Phys. Rev. Lett. **115**, 267207 (2015)  
 \* Featured in several Japanese public media, [朝日新聞](#), [財経新聞](#), [マイナビニュース](#), [日経産業新聞](#)
3. Large magnetochromism in multiferroic  $\text{MnWO}_4$   
**S.Toyoda**, N. Abe, T. Arima, and S. Kimura.  
 Phys. Rev. B **91**, 054417 (2015)
4. Ferroelectricity driven by charge ordering in the A-site ordered perovskite manganite  $\text{SmBaMn}_2\text{O}_6$   
 H. Sagayama, **S.Toyoda**, K. Sugimoto, Y. Maeda, S. Yamada, and T. Arima.  
 Phys. Rev. B **90**, 241113(R) (2014)

### *Presentations (International conference)*

1. One-way transparency of light in multiferroic  $\text{CuB}_2\text{O}_4$  (poster)  
 20th International Conference on Magnetism, TU.A-P60, Barcelona, (2015/07)  
**S.Toyoda**, N. Abe, S. Kimura, Y. H. Matsuda, T. Nomura, A. Ikeda, S. Takeyama, and T. Arima.  
 \* **Best Poster Award**
2. Colossal directional dichroism in a multiferroic  $\text{CuB}_2\text{O}_4$  (oral)  
 American Physical Society March meeting, M6.00006, San Antonio, (2015/03)  
**S.Toyoda**, N. Abe, S. Kimura, Y. H. Matsuda, T. Nomura, A. Ikeda, S. Takeyama, and T. Arima.
3. Microscopic Mechanism of Giant Non-reciprocal Directional Dichroism in  $\text{CuB}_2\text{O}_4$  (oral)  
 American Physical Society March meeting, J4.00012, Denver, (2014/03)  
**S.Toyoda**, N. Abe, S. Kimura, and T. Arima.
4. Spin-orbital coupled state in  $\text{CuB}_2\text{O}_4$  (poster)  
 FIRST-QS<sup>2</sup>C Workshop on "Emergent Phenomena of Correlated Materials", P46, Tokyo, (2013/11)  
**S.Toyoda**, N. Abe, S. Kimura, and T. Arima.
5. Large magneto-chromism in  $\text{MnWO}_4$  (poster)  
 International Conference on Strongly Correlated Electron Systems, Tokyo, (2013/08)  
**S.Toyoda**, N. Abe, N. D. Khanh, S. Kimura, and T. Arima.
6. X-ray diffuse scattering of pyrochlore niobium oxides  $\text{R}_2\text{Nb}_2\text{O}_7$  (poster)  
 19th International Conference on Magnetism, PG20, Busan, (2012/07)  
**S.Toyoda**, H. Sagayama, K. Sugimoto, and T. Arima.

### *Presentations (Domestic conference)*

1. Directional dichroism for luminescence in  $\text{CuB}_2\text{O}_4$  (oral)  
Japan Physical Society Spring Meeting, 21aBP-7, Tohoku Gakuin University, (2016/03)  
**S.Toyoda**, N. Abe, and T. Arima.
2. One-way transparency of light in multiferroic  $\text{CuB}_2\text{O}_4$  (oral)  
10th Japan Symposium on Boron, Borides and Related Materials, The University of Tokyo, (2016/03)  
**S.Toyoda**, N. Abe, S. Kimura, Y. H. Matsuda, T. Nomura, A. Ikeda, S. Takeyama, and T. Arima.  
\* **Invited**
3. Colossal directional dichroism in a multiferroic  $\text{CuB}_2\text{O}_4$  (oral)  
Japan Physical Society Spring Meeting, 24aCN-12, Waseda University, (2015/03)  
**S.Toyoda**, N. Abe, S. Kimura, Y. H. Matsuda, T. Nomura, A. Ikeda, S. Takeyama, and T. Arima.
4. Microscopic mechanism of directional dichroism in multiferroic  $\text{CuB}_2\text{O}_4$  (oral)  
Japan Physical Society Spring Meeting, 28aCK-3, Tokai University, (2014/03)  
**S.Toyoda**, N. Abe, S. Kimura, and T. Arima.
5. Spectroscopic study of magneto-electric transitions in  $\text{MnWO}_4$  (oral)  
Japan Physical Society Spring Meeting, 29aXT-7, Hiroshima University, (2013/03)  
**S.Toyoda**, N. Abe, N. D. Khanh, S. Kimura, and T. Arima.
6. Single-crystal structure analysis of pyrochlore  $\text{R}_2\text{Nb}_2\text{O}_7$  by using synchrotron radiation (oral)  
Japan Physical Society Fall Meeting, 18aGA-9, Yokohama National University, (2012/09)  
**S.Toyoda**, T. Okawa, H. Sagayama, N. Abe, T. Arima, and K. Sugimoto.

### *Thesis*

1. Master thesis, Department of Advanced Materials Science, The University of Tokyo  
Toward infinite directional dichroism in  $\text{CuB}_2\text{O}_4$   
\* **Thesis Prize**
2. Graduation thesis, Department of Applied Physics, The University of Tokyo  
X-ray single crystal structure analysis of pyrochlore  $\text{R}_2\text{Nb}_2\text{O}_7$  (in Japanese)

### Press Coverage

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2016年1月14日	日経産業新聞 (8面)	「一方向の光だけ通す結晶」
2016年1月7日	朝日新聞 (朝刊 21面)	「この物質、光は一方通行」
2015年12月25日	財経新聞	「一方向からだけ透明になる物質を初めて発見」