

Sotirios Fragkos

PhD Candidate | Materials Science

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Education

PhD candidate - Materials Science

02/2019 – Today

University of West Attica

Department of Mechanical Engineering

Thesis: *“On topological properties of materials: Topological insulators, Weyl and Dirac semimetals”*. Supervisors: Y. Panayiotatos, A. Dimoulas, A. Chroneos

BSc - Mechanical engineering

09/2012 – 01/2018

Technological Educational Institute of Piraeus

Thesis: *“On electronic band structure of 2D materials, combining angle resolved photoemission spectroscopy (ARPES) and density functional theory (DFT)”*. Supervisor: Y. Panayiotatos

Research – Professional experience

PhD candidate - Materials Science

03/2019 – Today

NCSR “Demokritos”

ESSL of the Institute of Nanoscience and Nanotechnology, Athens, Greece.

Dissertation: *“On topological properties of materials: Topological insulators, Weyl and Dirac semimetals”*. Supervisors: Y. Panayiotatos, A. Dimoulas, A. Chroneos

Research assistant – Postgraduate student

09/2017 – 02/2019

NCSR “Demokritos”

Study of topological and 2D materials by first-principles calculations and experimental characterization through ARPES at ESSL of the Institute of Nanoscience and Nanotechnology / NCSR “Demokritos”, Athens, Greece.

Internship - Undergraduate student

03/2017 – 09/2017

NCSR “Demokritos”

Internship as undergraduate student under NSRF foundation at ESSL of the Institute of Nanoscience and Nanotechnology / NCSR “Demokritos”, Athens, Greece.

Other research activities

SOLEIL Synchrotron – Paris

25/05/2021 – 31/05/2021

Beamline user at CASSIOPEE-B-ARPES beamline of the SOLEIL Synchrotron radiation facility in Paris, for the study of topological materials with synchrotron ARPES.

<https://www.synchrotron-soleil.fr/en/beamlines/cassiopee>

Advanced Light Source – Berkeley

08/10/2020 – 12/10/2020

Beamline user at Advanced Light Source of the Lawrence Berkeley National Laboratory in Berkeley - California, for the study of topological materials with synchrotron ARPES.

<https://als.lbl.gov/beamlines/10-0-1/>

SOLEIL Synchrotron – Paris

10/02/2020 – 17/02/2020

Beamline user at CASSIOPEE-B-ARPES beamline of the SOLEIL Synchrotron radiation facility in Paris, for the study of topological materials with synchrotron ARPES.

<https://www.synchrotron-soleil.fr/en/beamlines/cassiopee>

Participation in funded research projects

3εFERRO

03/2021

“3εFERRO: Energy Efficient Embedded Non-volatile Memory & Logic based on Ferroelectric $\text{Hf}(\text{Zr})\text{O}_2$ ” Grant agreement ID: 780302, European Union H2020. Research director: A. Dimoulas, NCSR “Demokritos”. <https://3eferro.eu/>

SKYTOP

03/2019 – Today

“SKYTOP: Skyrmion - Topological insulator and Weyl semimetal technology” Grant agreement ID: 824123, European Union H2020. Research director: A. Dimoulas, NCSR “Demokritos”.

<https://skytop-project.eu/>

INVEST

05/2018 – 11/2018

“INVEST: Integration of very high-k dielectrics with Silicon CMOS technology” Grant agreement ID: 28495, European council FP5-IST. Research director: A. Dimoulas, NCSR “Demokritos”.

<https://cordis.europa.eu/project/id/IST-2000-28495>

Publications

- [1] E. Xenogiannopoulou, D. Tsoutsou, P. Tsipas, **S. Fragkos**, S. Chaitoglou, N. Kelaidis and A. Dimoulas, Ultrathin epitaxial Bi film growth on 2D HfTe_2 template, *Nanotechnology* 33, 015701 (2021). <https://doi.org/10.1088/1361-6528/ac2d08>
- [2] P. Tsipas, P. Pappas, E. Symeonidou, **S. Fragkos**, C. Zacharaki, E. Xenogiannopoulou, N. Siannas and A. Dimoulas, Epitaxial HfTe_2 Dirac semimetal in the 2D limit, *APL Mater.* 9, 101103 (2021). <https://doi.org/10.1063/5.0065839>
- [3] **S. Fragkos**, P. Tsipas, E. Xenogiannopoulou, Y. Panayiotatos and A. Dimoulas, Type-III Dirac fermions in $\text{Hf}_x\text{Zr}_{1-x}\text{Te}_2$ topological semimetal candidate, *J. Appl. Phys.* 129, 075104 (2021). <https://doi.org/10.1063/5.0038799>

- [4] **S. Fragkos**, L. Baringthon, P. Tsipas, E. Xenogiannopoulou, P. Le Fèvre, P. Kumar, H. Okuno, N. Reyren, A. Lemaitre, G. Patriarche, J.-M. George and A. Dimoulas, *Topological surface states in epitaxial $(\text{SnBi}_2\text{Te}_4)_n(\text{Bi}_2\text{Te}_3)_m$ natural van der Waals superlattices*, **Phys. Rev. Materials** 5, 014203 (2021). <https://doi.org/10.1103/PhysRevMaterials.5.014203>
- [5] **S. Fragkos**, R. Sant, C. Alvarez, E. Golias, J. Marquez-Velasco, P. Tsipas, D. Tsoutsou, S. Aminalragia-Giamini, E. Xenogiannopoulou, H. Okuno, G. Renaud, O. Rader and A. Dimoulas, *Topological band crossings in epitaxial strained SnTe*, **Phys. Rev. Materials** 3, 104201 (2019). <https://doi.org/10.1103/PhysRevMaterials.3.104201>
- [6] C. Zacharaki, P. Tsipas, S. Chaitoglou, **S. Fragkos**, M. Axiotis, A. Lagoyiannis, R. Negrea, L. Pintilie and A. Dimoulas, *Very large remanent polarization in ferroelectric $\text{Hf}_{1-x}\text{Zr}_x\text{O}_2$ grown on Ge substrates by plasma assisted atomic oxygen deposition*, **Appl. Phys. Lett.** 114, 112901 (2019). <https://doi.org/10.1063/1.5090036>
- [7] **S. Fragkos**, R. Sant, C. Alvarez, P. Tsipas, D. Tsoutsou, H. Okuno, G. Renaud, R. Alcotte, T. Baron and A. Dimoulas, *Room Temperature Commensurate Charge Density Wave in Epitaxial Strained TiTe_2 Multilayer Films*, **Adv. Mater. Interfaces** 6, 1801850 (2019). <https://doi.org/10.1002/admi.201801850>
- [8] P. Tsipas, **S. Fragkos**, D. Tsoutsou, C. Alvarez, R. Sant, G. Renaud, H. Okuno, and A. Dimoulas, *Direct Observation at Room Temperature of the Orthorhombic Weyl Semimetal Phase in Thin Epitaxial MoTe_2* , **Adv. Funct. Mater.** 28, 1802084 (2018). <https://doi.org/10.1002/adfm.201802084>
- [9] P. Tsipas, D. Tsoutsou, **S. Fragkos**, R. Sant, C. Alvarez, H. Okuno, G. Renaud, R. Alcotte, T. Baron, and A. Dimoulas, *Massless Dirac Fermions in ZrTe_2 Semimetal Grown on InAs (111) by van der Waals Epitaxy*, **ACS Nano** 12, 1696-1703 (2018). <https://doi.org/10.1021/acsnano.7b08350>

Conferences

- [1] **S. Fragkos**, P. Tsipas, E. Xenogiannopoulou, Y. Panayiotatos and A. Dimoulas, Type-I, II and III topological Dirac semimetals in 1T transition metal ditelluride family, **35th Panhellenic Conference on Solid State Physics and Materials Science**, Virtual, 26-29 September 2019. *Oral presentation*
<http://xxxv-ssm.inn.demokritos.gr/>
- [2] E. Xenogiannopoulou, D. Tsoutsou, P. Tsipas, **S. Fragkos**, N. Kelaidis, A. Dimoulas, Ultrathin epitaxial Bi film growth on $\text{HfTe}_2/\text{InAs}(111)$ template, **EUROMAT 2021**, Virtual, 13-17 September 2021. *Oral presentation*
<https://submit.asmet.org/event/53/contributions/3926/>
- [3] **S. Fragkos**, P. Tsipas, E. Xenogiannopoulou, Y. Panayiotatos and A. Dimoulas, Type-I, II and III topological Dirac semimetals in group IV 2D transition metal ditelluride family, **EUROMAT 2021**, Virtual, 13-17 September 2021. *Oral presentation*
<https://submit.asmet.org/event/53/contributions/3925/>
- [4] **S. Fragkos**, P. Tsipas, D. Tsoutsou, E. Xenogiannopoulou, R. Sant, C. Alvarez, G. Renaud, H. Okuno, Y. Panayiotatos and A. Dimoulas, Epitaxial HfTe_2 , ZrTe_2 and type-III Dirac fermions in $\text{Hf}_x\text{Zr}_{1-x}\text{Te}_2$ topological semimetal candidate, **APS March Meeting**, Virtual, 15-19 March 2021. *Oral presentation*
<https://meetings.aps.org/Meeting/MAR21/Event/398517>
- [5] **S. Fragkos**, P. Tsipas, D. Tsoutsou, R. Sant, C. Alvarez, G. Renaud, H. Okuno, and A. Dimoulas, Epitaxial growth and characterization of topological semimetals from the 2D transition metal

dichalcogenides family, *APS March Meeting*, Denver – Colorado, 2-6 March 2020. *Oral presentation*

<http://meetings.aps.org/Meeting/MAR20/Session/B60.4>

- [6] **S. Fragkos**, P. Tsipas, D. Tsoutsou, R. Sant, C. Alvarez, G. Renaud, H. Okuno, and A. Dimoulas, Epitaxial growth and characterization of 2D transition metal dichalcogenides topological semimetals, *XXXIV Panhellenic Conference on Solid State Physics and Materials Science*, Patras, 11-14 September 2019. *Oral presentation*
<http://xxxiv-ssm.upatras.gr/program/>

General research interests

- **Materials:** Two-dimensional, topological insulators and semimetals, 2D magnetic and skyrmionic materials
- **Methods:** DFT / First-principles calculations, atomistic spin simulations, MBE growth and ARPES characterization of electronic band structure.

Languages

- **Greek** - Native speaker
- **English** - Certificate of Competency in English B2 (The University of Michigan)
- **German** - Zertifikat Deutsch B1 (Goethe - Institut)