Dr. MANIKANDAN KRISHNAN M.Sc., MPhil., Ph.D.,

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RESEARCH SUMMARY

Ph.D. and post-doctoral research experience in Physics and Material Science, with a strong foundation in experimental condensed matter physics. Specialized in synthesizing single and polycrystalline strongly correlated materials with a focus on systems exhibiting magnetism and superconductivity under both ambient and high-pressure conditions. Proficient in advanced magnetization and transport measurement techniques at low temperatures and high pressures. Experienced in the investigating quantum materials exhibiting strong magnetism, topological surface states and Fermi surface reconstruction under ambient and high pressure conditions. Demonstrated strong communications, mentoring, and teaching abilities developed through academic instruction and collaborative research. Capable of working independently as well as effectively within interdisciplinary research teams.

RESEARCH INTERESTS

- ✓ Experimental condensed matter physics
- ✓ Superconductivity (Conventional & unconventional)
- ✓ Strongly correlated electron systems
- ✓ High entropy alloys superconductors
- ✓ Quantum Materials
- ✓ High pressure and Low temperature physics
- ✓ Magnetism and transport properties
- ✓ Multiferroic property and Energy application of hexaferrites

ACADEMIC QUALIFICATION

S. No.	Degree	Subject	University / Institute	Year	Grade
1.	Ph.D.,	Physics	Bharathidasan University	April 2021	---
2.	M.Phil.,	Physics	Pondicherry University	May 2012	8.97
3.	M.Sc.,	Physics	Bharathidasan University	April 2011	7.51
4.	B.Sc.,	Physics	Bishop Heber College / Bharathidasan University	April 2009	8.82

DOCTORAL STUDIES

Dissertation title	High pressure impact on superconducting and transport characteristics of $Sr_{0.1}Bi_2Se_3$, M_xNbSe_2 (M = Fe, Cr, V & Zn) and $Fe_{1.09}Se_{0.55}Te_{0.45}$
Institute	Centre for High Pressure Research, Department of Physics, Bharathidasan University, Tiruchirappalli – 620024, Tamil Nadu, India
Year of Award	April 2021

RESEARCH / WORK EXPERIENCE

S. No.	Position	University/Institute	Period	
			From	To
1.	Post-doctoral Fellow	Laboratory of Functional Molecules and Materials, School of Physics and Optoelectronic Engineering, Shandong University of Technology, Zibo, Shandong, China	07/2022	07/2025

RESEARCH EXPERTISE

- Intermetallic and high entropy compounds synthesis via the arc-melt method
- Single crystal Growth using CVT and self-flux method
- Polycrystalline samples synthesis via solid-state reaction and sol-gel route
- Hands on training of transport and magnetic measurements using PPMS and MPMS
- Low temperature, high pressure magnetization, transport and structural measurements
- Flux pinning and vortex dynamic properties of superconductors
- Structural, magnetic and spectroscopic studies on metal oxide nanomaterials and composites

HAND-ON TRAINGING (INSTRUMENTS)

- Physical property measurement system- Variable temperature Insert (PPMS-VSM)
- Physical property measurement system (Electrical resistivity, Heat capacity and Hall resistivity)
- Magnetic property measurement system
- X-ray diffraction
- Piston cylinder pressure cell (~1 GPa (M(T))& ~3 GPa (R(T)))

AWARDS & HONOUR

S. No	Name	Institute / Funding Agency	Month & Year
1.	Young Scientist Award – 2019	Materials Research Society of India (MRSI)-Trichy Chapter. India	March 2019

RESEARCH FELLOWSHIP

S. No	Position	Institute / Funding Agency	Month & Year
1.	Visiting Researcher	ISSP, University of Tokyo, Japan	December, 2023
2.	Visiting Researcher	ISSP, University of Tokyo, Japan	February, 2019
3.	Senior Research Fellow	UGC, Govt. of India	April, 2018
4.	Junior Research Fellow	UGC, Govt. of India	April, 2016
5.	Junior Research Fellow	DST-SERB, Govt. of India	May, 2015
6.	Visiting Researcher	ISSP, University of Tokyo, Japan	November, 2013
7.	Project Assistant	DST-IDP, Govt. of India	August, 2012

PUBLICATIONS

Publications (to be published)

1. **Manikandan Krishnan***, Jiaojiao Meng, Yanmei Ma, Cao Wang, Dilip Bhoi, Yoshiya Uwatoko, Qiang Jing, Bo Liu, *Pressure effect on Superconducting properties on bcc type Ta-Nb-W-Mo-Hf High Entropy Alloys* **Under preparation**.
2. **Manikandan Krishnan***, Raman Sankar, Arumugam Sonachalam, Yoshiya Uwatoko, Bo Liu, *Pressure induced Fermi surface reconstruction and superconductivity in* $FeSe_{0.55}Te_{0.45}$, **Under preparation**.

Publications (* denotes for corresponding author)

1. **Manikandan Krishnan***, Jiaojiao Meng, Cao Wang, Yoshiya Uwatoko, Qiang Jing, Bo Liu, *Superconducting ground state and normal state properties on Hf-Nb-Ta-Mo-W high entropy alloys,* **Supercond. Sci. Technol. 38** 095009 (2025).
2. Rajkumar Sokkalingam, **Manikandan Krishnan,** K.J. Sankaran, Arumugam Sonachalam, Arjun Kumar Bojarajan, Sambasivam Sangaraju, *Unraveling the role of copper intercalation and doping on* $NiTe_2$ *to enhance electrochemical performances,* **Materials Science for Energy Technologies., 8** 200 (2025).
3. **Manikandan Krishnan***, Jiaojiao Meng, Bai-zhuo Li, Yanmei Ma, Cao Wang, Dilip Bhoi, Yoshiya Uwatoko, Qiang Jing, Bo Liu, *Evolution of structural dependent superconducting properties on Re-Os-W-Mo-Ta high entropy alloys*，**Supercond. Sci. Technol. 38** 075014 (2025).
4. **Manikandan Krishnan***, Yoshiya Uwatoko, Qiang Jing, Bo Liu, *Superconducting and normal state properties on TaNbZrTi and TaNbHfZr high entropy alloys,* **J. Alloys. Compd., 1036** 181813 (2025).
5. **Manikandan Krishnan**, Jiaojiao Meng, Bai-zhuo Li, Yanmei Ma, Cao Wang, Dilip Bhoi, Yoshiya Uwatoko, Qiang Jing, Bo Liu, *Superconducting Ground State and Electronic Properties of σ-Phase Ta-W-Mo-Re-Os High Entropy Alloys* **J. Phys. Chem. Solids., 202** 112630 (2025).
6. **Manikandan Krishnan**, Kento Ishigaki, Sathiskumar Mariappan, Rajkumar Sokkalingam, Jun Gouchi, Dilip Bhoi, Raman Sankar, Ponniah Vajeeston, Yoshiya

Uwatoko, Arumugam Sonachalam, *Evolution of superconducting and normal state properties of $Fe_{1.09}Se_{0.55}Te_{0.45}$ under pressure*, **J. Phys. Chem. Solids., 201** 112628 (2025).

7. Rajkumar Sokkalingam, **Manikandan Krishnan,** Jesman Sthevan Kovil Pitchai, Sivakumar Periyasamy, Arjun Kumar Bojarajan, Arumugam Sonachalam, Sambasivam Sangaraju, *Chemical Pressure-Induced enhancement of electrochemical performance in $Ni_{1-X}Cu_xTe_2$ (X = 0 and 0.10) layered compounds*, **Electrochem. Commun., 171** 107872 (2025).
8. Sathiskumar Mariappan, Dilip Bhoi, **K. Manikandan**, Nagasaki Shoko, Ponniah Vajeeston, Arushi, Roshan Kumar Kushwaha, R P Singh, Arumugam Sonachalam, and Yoshiya Uwatoko, *Electronic properties of α-Mn-type non-centrosymmetric superconductor $Re_{5.5}Ta$ under hydrostatic pressure*, **Supercond. Sci. Technol., 36** 025002 (2023).
9. S. Mahalakshmi, J. Mayandi, S. Suresh, V. Ragavendran, **K. Manikandan**, S. Arumugam, J. M. Pearce and V. Venkatachalapathy, *Enriched second-harmonic generation in meta-phase barium titanate nanostructures synthesized by sol-gel hydrothermal method*, **J. Alloys. Compd., 936** 168171 (2022).
10. Sathiskumar Mariappan, **Manikandan Krishnan**, Dilip Bhoi, Hanming Ma, Jun Gouchi, R. P. Singh, Ponnaih Vajeeston, Arumugam Sonachalam and Yoshiya Uwatoko, *Superconducting and structural properties of non-centrosymmetric Re_6Hf superconductor under high pressure*, **Phys. Rev. B**., **105** 224505 (2022).
11. **K. Manikandan,** Rukshana Pervin, C. Saravanan, M. Sathiskumar, Velaga Srihari, Himashu Kumar Poswal, Parasharam M. Shirage, S, Arumugam, "*Influence of pressure on transport, magnetic and structural properties of superconducting $Cr_{0.0009}NbSe_2$ single crystal"*, **RSC Advances., 10** 13112 (2020).
12. Rukshana Pervin, **K. Manikandan,** Sonachalam Arumugam, Parasharam M. Shirage, *"Disordering induced second magnetization peak effect and the vortex pinning mechanism in $V_{0.0007}NbSe_2$ single crystal"*, **J. Supercond. Nov. Magn.**, **33** 2679 (2020).
13. Rukshana Pervin, **K. Manikandan,** Sonachalam Arumugam, Parasharam M. Shirage *"Second Magnetization Peak Effect and the Vortex Phase Diagram of $V_{0.0015}NbSe_2$ Single Crystal",* **J. Magn. Magn. Mater.**, **507** 166817 (2020).
14. S. Arumugam, N. Subbulakshmi, **K. Manikandan,** M. Kannan, D. A. Mayoh, M. R. Lees, G. Balakrishnan *"Investigation of the transport, magnetic and flux pinning properties of the non-centrosymmetric superconductor $TaRh_2B_2$ under hydrostatic pressure",* **Physica C: Superconductivity and its Applications**., **571** 1353586 (2020).
15. S. Arumugam*, **K. Manikandan***, Kent Ishigaki, Jun Gouchi, Rukshana Pervin, G. Kalai Selvan, Parasharam M. Shirage and Y. Uwatoko "*Enhancement of superconducting properties and flux pinning mechanism on $Cr_{0.0005}NbSe_2$ single crystal under Hydrostatic pressure",* **Scientific Reports, 9** 347 (2019) **(Equal contribution).**
16. N. Subbulakshmi*, G. Kalai Selvan, **K. Manikandan***, M. Kannan, Z. Haque, L. C. Gupta, A. K. Ganguli, S. Arumugam, *"Effect of Hydrostatic Pressure on $Eu_{3-x}Sr_xBi_2S_{4-y}Se_yF_4$ (x*

= 1 and 2 and y = 1.5 and 2) Superconductors", **J. Supercond. Nov. Magn. 32** 2359 (2019) **(Equal contribution)**.

17. Murugesan Kannan, Sonachalam Arumugam, Raman Thiyagarajan, Ganesan Kalaiselvan, **K. Manikandan,** Prakriti Neha, Satyabrata Patnaik, *"Hydrostatic Pressure Effect on the Pinning Mechanism of α-BiPd Non-centrosymmetric Superconductors",* **Phys. status solidi RRL., 13** 1900344 (2019).
18. Rukshana Pervin, **K. Manikandan,** Arumugam Sonachalam, Parasharam M. Shirage, *"Coexistence of Superconductivity and Ferromagnetic in defect induced $NbSe_2$ Single Crystals",* **J. Mater. Sci. 54** 11903 (2019).
19. N. Subbulakshmi, G. Kalaiselvan, **K. Manikandan,** R. Thiyagarajan, S. Arumugam, *"Hydrostatic pressure effect on superconductivity and vortex pinning mechanism of $Sr(Fe_{0.88}Co_{0.12})_2As_2$ single crystal",* **Physica C: Superconductivity and its Applications 563** 22 (2019).
20. E. Meher Abhinav, Anuraj Sundararaj, D. Jaison, Gopalakrishnan Chandrasekaran, **K. Manikandan,** S. Arumugam, S.V. Kasmir Raja*, "Influence of ERTA on magnetocaloric properties of Sr doped $BaFe_{12}O_{19}$ thin films",* **Applied Surface Science., 483** 26 (2019).
21. **K. Manikandan,** Rukshana Pervin, G Kalai Selvan, M. Kannan, L.Govindaraj, Akshay Kumar Varma, Parasharam M. Shirage and S. Arumugam, *"Pressure assisted enhancement in superconducting properties of Fe substituted $NbSe_2$ single crystal",* **Scientific Reports, 8** 1251 (2018).
22. P. Neha, P. Sivaprakash, K. Ishigaki, G. Kalaiselvan, **K. Manikandan,** Y. Uwatoko, R.S. Dhaka, S. Arumugam, S. Patnaik, *"Novel Superconductivity in Endohedral Gallide Mo_8Ga_{41}",* **Mater. Res. Express., 6,** 016002 (2018).
23. Rukshana Pervin, **K. Manikandan,** Amit Kumar Rana, Sonachalam Arumugam, Parasharam M. Shirage, *"Effect of Cr Atoms in Vortex dynamics of $NbSe_2$ Superconductor and Study of Second Magnetization Peak Effect",* **Mater. Res. Express., 7,** 076001 (2018).
24. S. Arumugam, P. Sivaprakash, S. Esakki Muthua, D.M. Raj kumar, M. Manivel Raja, **K. Manikandan,** M. Kannan, *"Enhanced magnetocaloric effect and magnetic properties in $Ni_{47}Mn_{40-x}Fe_xIn_{13}$ (x = 1,2) Heusler alloy",* **J. Magn. Magn. Mater., 465,** (2018) 566–568.
25. Thiyagarajan Dhandayuthapani, Madhusoodhananpillai Girish, Sivakumar Rengasamy, Sanjeeviraja, C. Gopalakrishnan, C. Nagarajan, Ragavendran Mathew, Sinu Ding, Jun , Thirumalai Venkatesan, G. Kalai Selvan, **K. Manikanadan** and S. Arumugam, *"γ- MnS films with 3D microarchitectures: Comprehensive study of the synthesis, micro structural, optical and magnetic properties"* **Cryst. Eng. Comm., 20** 578 (2018).
26. **K. Manikandan,** Shruti, P. Neha, G. Kalai Selvan, B. Wang, Y. Uwatoko, K. Ishigaki, R. Jha, V.P.S. Awana, S. Arumugam, S. Patnaik, *"Possibility for conventional superconductivity in $Sr_{0.1}Bi_2Se_3$ from high-pressure transport studies",* **Europhys. Lett., 118** 47008 (2017).

27. Rukshana Pervin, **K. Manikanadan**, Amit Kumar Rana, M. Kannan, S. Arumugam and Parasharam M. Shirage, *"Enhancement of superconducting critical current density by Fe impurity substitution in $NbSe_2$ single crystals and the vortex pinning mechanism"*, **Phys. Chem. Chem. Phys., 19** 11230 (2017).

28. S. Arumugam, C. Ganguli, R. Thiyagarajan, D. Bhoi, G. Kalai Selvan, **K. Manikandan,** A. Pariari, P. Mandal, and Y. Uwatoko, *"Effect of pressure on normal and superconducting state properties of iron based superconductor $PrFeAsO_{0.6}Fy$ (y=0.12,0.14)",* **Scientific Reports., 7** 11731 (2017).

29. C. Saravanan, R. Thiyagarajan, **K. Manikandan,** M. Sathiskumar, P. V. Kanjariya, J. A. Bhalodia and S. Arumugam, *"Effect of Cd doping on magnetocaloric effect and critical behavior analysis on perovskite $Nd_{1-x}Cd_xMnO_3$ (x = 0, 0.1, 0.2, 0.3, and 0.4) manganite polycrystals"*, **J. Appl. Phys., 122** 245109 (2017).

30. Kalai Selvan. G, Thakur, Gohil, **K. Manikandan**, Banerjee Alok, Haque Zeba, gupta Laxmi, Ganguli Ashok, Arumugam Sonachalam, *"Superconductivity in $La_{1-x}Sm_xO_{0.5}F_{0.5}BiS_2$ (x = 0.2, 0.8) under hydrostatic pressure"*, **J. Phys. D: Appl. Phys., 49,** 275002 (2016).

31. R. Thiyagarajan, S. Esakki Muthu, **K. Manikandan**, S. Arumugam, *"Effect of Hydrostatic pressure on magnetic and magnetocaloric properties in $La_{0.35}Pr_{0.35}Ca_{0.3}MnO_3$"*, **J. Magn. Magn. Mater., 398** 116 (2016).

32. Ganesan Kalai Selvan, Gohil Singh Thakur, **K. Manikandan**, Yoshia Uwatoko, Zeba Haque, Laxmi Chand Gupta, Ashok Kumar Ganguli, and Sonachalam Arumugam, *"Upper Critical Field, Critical Current Density and Activation Energy of the New $La_{1-x}Sm_xO_{0.5}F_{0.5}BiS_2$ (x = 0.2, 0.8) Superconductors",* **J. Phys. Soc. Jpn., 84,** 124701(2015)**.**

33. **K. Manikandan**, S. Arumugam and G. Chandrasekaran, "*Effect of annealing temperature on Titania Nanoparticles",* **AIP Conference Proceedings.,** ***1591*** 128 (2014).

Publications (book):

1. S. Arumugam et al., Proceeding of *"29th Annual General Meeting Of Materials Research Society Of India & National Symposium On "Advances In Functional And Exotic Materials",* (2018) **eInk Solutions, Tiruchirappalli, Tamil Nadu, India** ISBN: 978-93-87526-16-7.

RESEARCH PROFILES

Scopus ID	57210226125
Orcid ID	https://orcid.org/0000-0002-5297-6668
Web of Science Researcher ID	AAU-7311-2021
h-index :	10 (WoS)

INVITED TALK / CONFERENCES / WORKSHOPS / SYMPOSIUMS

(Invited Talk)

1. **"***Superconducting and normal state properties on high entropy alloy superconductors",* International Conference on Advanced Materials – ICAM 2025, organized by the Department of Physics, St. Joseph's College (Autonomous), Tiruchirappalli – 62002, Tamil Nadu India will be during 30-31, January 2025.

(Presented)

1. **K. Manikandan** *et al., "Effect of hydrostatic pressure on superconducting properties and flux dynamics of Fe and Cr substituted $NbSe_2$ single crystal",* **29TH Annual General Meeting Of Materials Research Society Of India & National Symposium On "Advances In Functional And Exotic Materials"** organized by the Centre for High pressure research, Bharathidasan University, Tiruchirappalli – 620 024, India in Association with prestigious Materials Research Society of India (MRSI-Trichy Chapter), will be during 14-16, February 2018.
2. **K. Manikandan** *et al., "Hydrostatic pressure and magnetic field effect on $Cr_{0.0005}NbSe_2$ single crystal"* **The 26th International Conference on High Pressure Science and Technology (AIRAPT 26) Joint with the 8th Asian Conference on High Pressure Research (ACHPR 8) & the 19th China High Pressure Conference (CHPC19),** National Convention Centre, China August 18th - 23rd, 2017 Beijing, China.
3. **K. Manikandan**, *et al.,* "*Magnetic properties of the Ising spin-chain system α-CoV_2O_6 under Hydrostatic Pressure",* **DAE-BRNS Symposium on Condensed Matter Physics under Extreme Conditions (CoMPEC-2016)**, Bhabha Atomic Research Centre, Mumbai, Apr. 13-16 (2016).
4. **K. Manikandan** *et al.,* "*Magnetic field induced ordered states of Low-Dimensional α and γ CoV_2O_6 under Hydrostatic pressure*", **National Conferences on Global Advances in Materials for Energy Engineering & Environmental Sciences,** Kumarasamy College of Engineering, Karur, India, Mar. 04 (2016).
5. **K. Manikandan** *et al., "Effect of Annealing Temperature on Titania Nanoparticles"*, **58th DAE – Solid State Physics Symposium,** Thapar University, Patiala, Punjab, Dec. 26 -30 (2013).

(Attended)

1. ***"Global Initiative for Academic Network workshop on Crystal Growth of Functional and Exotic Materials"*** organized by Centre for High Pressure Research, Department of Physics, Bharathidasan University, Tiruchirappalli – 620 024, Tamil Nadu during **06-10, August 2018**.
2. ***"Asia-Pacific Academy of Materials (APAM) Special Lecture Series"*** Jointly Organized by MRSI –Trichy Chapter & Centre for High Pressure Research, Bharathidasan University, Tiruchirappalli – 620 024 held at Bharathidasan University on **13th February 2018**.
3. ***"Global Initiative for Academic Network workshop on Materials under Extreme Conditions - Enabling Technologies and Applications"*** organized by the Centre for High Pressure Research, School of Physics, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India during **26 - 30, December 2016.**

4. ***"Global Initiative for Academic Network workshop on Physics of Strongly Correlated Electron Systems"*** organized by the Centre for High Pressure Research, School of Physics, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India during **19 - 23, December 2016.**

PERSONNEL INFORMATION

Date of birth	:	23/07/1987
Nationality	:	Indian
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DECLARATION

I hereby declare that the information furnished above is true, correct and complete to the best of my knowledge.

Place :
Date :

Manikandan Krishnan