

UNIVERSITY OF MILAN

PUBLIC SELECTION FOR RECRUITING 1 RESEARCH ASSOCIATE UNDER ART.24, PARAGRAPH 3.A, OF LAW No.240/2010, FOR COMPETITION SECTOR No. 02/B1 - EXPERIMENTAL PHYSICS OF MATTER, SCIENTIFIC DISCIPLINARY SECTOR No. FIS/O3 - PHYSICS OF MATTER, AT THE ALDO PONTREMOLI DEPARTMENT OF PHYSICS TO CARRY OUT RESEARCH BOUND TO TOPICS RELATED TO GREEN ISSUES, AS PROVIDED FOR BY MINISTERIAL DECREE No.1062/2021 OF 10 AUGUST 2021 (published on the University of Milan website in date \_04-10-2021\_) Competition code \_\_4864\_\_\_\_\_

### Curriculum-Vitae

**Dr. Arun Kumar**  
**D.O.B: 15-08-1992**

#### Educational Qualifications:

- **Ph.D. in Nanoscience and Advanced Technologies (FIS/01 Experimental Physics)** on thesis topic “**Structural and vibrational spectroscopy characterizations of carbon nanostructures synthesized using mineral oxides**” from University of Verona, Italy (November 2014-October 2017); Date of Defense: **26/04/2018. (Doctoral Degree)**
- **M.Sc. in Applied Physics** on thesis topic entitled “**Investigations on the synthesis, characterization & emerging photo-luminescence characteristics of engineered long decay phosphor for strategic applications**” from Amity University, India (2012-2014, First Class).
- **B.Sc. (Honours) Physics** from University of Delhi, Delhi, India (2009-2012, First Class).
- **LinkedIn Course Completion Certificates (PMI):** Six Sigma Foundations, Lean Six Sigma Foundations, Six Sigma: Green Belt, Excel: Statistical Process Control, Learning Minitab.
- **Safety & Security:** Worker specific course (chemical and cancerous risk), Medium risk for workers employed in University workshops.

#### Research Fellowship Contracts:

- **Post-Doctoral Fellow (Research Fellow)**, within European Union’s Horizon 2020 Project ‘**BEFOREHAND**’ G.A. No. 824957 (<http://www.beforehand.eu/>), on the topic entitled “**Synthesis of phase change chalcogenide nanostructures by means of chemical vapor deposition (MOCVD) process and their chemical-physical characterization**” CNR-Institute for Microelectronics & Microsystems, Agrate Unit, Italy (**16 September 2019 - Present**).
  - ✓ MOCVD process development of chalcogenide heterostructures for non-volatile (nVM) phase change memories (PCM) in collaboration with *STMicroelectronics*.
  - ✓ MOCVD epitaxial growth of 2D thin films TIs for EU Project ‘**SKYTOP**’ (<https://skytop-project.eu/>) with industrial partner as *AIXTRON & Thales Group*.
  - ✓ Perform clean room operations, & develop new growth recipes with different precursors.
  - ✓ Analytical characterization of thin films & heterostructures via SEM, & TXRF.

✓ Directly report to the scientific responsible & write deliverable for European Commission.

- **Post-Doctoral Fellow (Research Fellow)**, within European Union's Horizon 2020 Project 'SOLSA' G.A. No. 689868 (<http://solsa-mining.eu/>), on the topic entitled "**Vibrational Spectroscopy study of: i) mineral samples of archeological origin and ii) composite materials obtained by means of geo-exploration carried out within 'SOLSA' UE project**" University of Verona, Italy (17 November 2017 – 15 September 2019).

- ✓ Explored vibrational spectroscopy of synthetic, mineralogical samples, composites materials and thin film based solar cells materials synthesized via PECVD process.
- ✓ Proposed technical expertise & solve issues for development of new analytical SOLSA Expert System instrument developed by *ThermoScientific*.
- ✓ Data processing and interpretation of results for presentation in technical meetings.

### **Attested Training or Research Activities at Qualified Italian or Foreign Institutions:**

- **Visiting Researcher & Principal Investigator**, Bar Ilan University, Ramat Gan, Israel, (July 2017 - September 2017).
  - ✓ High yield and large area growth of Carbon nanomaterials & thin film via CVD process.
  - ✓ Perform experimental characterization via HRSEM, XRD & micro Raman Spectroscopy
- **Advisory Board Member**, **Raman Open Database (ROD)** developed within European Union's Horizon 2020 Project 'SOLSA' G.A. No. 689868 (<http://solsa.crystallography.net/rod/>), (September 2016 - Present).
  - ✓ Developed world's first ROD interconnected with Crystallography Open Database.
  - ✓ Prepared and review technical documentation in order to provide effective support.
  - ✓ Authored 70 Raman Spectrum as Personal Communication to ROD.
- **Master's Student Trainee**, CSIR - National Physical Laboratory, New Delhi, India, (January 2014 - September 2014).
  - ✓ Developed Lanthanide Luminescent Materials for LEDs & strategic applications.
  - ✓ Learnt PL Spectroscopy Confocal PL Mapping System.

### **Experimental Research Skills:**

- **Synthesis:** MOCVD / MOVPE, CVD, PECVD, Solid State Reaction & Sol-Gel method.
- **Analytical Characterization Techniques:** Scanning Electron Microscopy, TXRF, Hall Effect, XRD, Micro Raman, FTIR, UV- VIS, PL Spectroscopy, PL Mapping.

**IT Skills:** Microsoft Office: Professional, MOCVD AIXTRON Virtual Platform, Origin, Horiba Labspec5,6; OMNIC Thermo Fisher Software (for PCA, MCR, Image Analysis), Zeiss SUPRA SmartSEM: Professional, MATLAB, Python, COMSOL Multiphysics: Basic.

## **Implementation of Projects and Participations:**

1. Role: **Principal Investigator**, Project Title: Synthesis, characterization vibrational spectroscopy of carbon nanostructure growth using natural materials as catalyst/precursor; Funding Agency: University of Verona, Italy; Award Amount: Euro 2500.00; Period: July - Sep. 2017. [*Physchem 1 (1)*, 4-25; *Minerals 11 (2)*, 188; *Diamond and Related Materials 97*, 107433; *ACS Applied Nano Materials 1 (11)*, 6046-6054, *Journal of the American Ceramic Society 100 (10)*, 4611-4621]

### ***Below are programs in which I am/was one of the participating researchers:***

2. Role: **Post-Doctoral Fellow**, Project Title: Boosting Performance of Phase Change Devices by Hetero- and Nano-Structure Material Design (BEFOREHAND); Project Coordinator: Dr. Raffaella Calarco; Source of Support: EU Horizon 2020; Award Amount: € 3999451.25; Grant Agreement ID: 824957, Period: 01/01/2019 – 30/06/2022. [*Coatings 11 (6)*, 718]
3. Role: **Collaborative Research**, Project Title: Skyrmion-Topological insulator and Weyl semimetal technology (SKYTOP); Project Coordinator: Dr. Athanasios Dimoulas; Source of Support: EU Horizon 2020; Award Amount: € 4508487.50; Grant Agreement ID: 824123, Period: 01/11/2018 – 30/04/2023. [*Crystal Growth & Design 21 (7)*, 4023–4029; *Adv. Mater. Interfaces 2021*, 2101244]
4. Role: **Post-Doctoral Fellow**, Project Title: Sonic Drilling coupled with Automated Mineralogy and chemistry On-Line-On-Mine-Real-Time (SOLSA); Project Coordinator: Dr. Monique Le Guen; Source of Support: EU Horizon 2020; Award Amount: € 9775488.25; Grant Agreement ID: 689868, Period: 01/02/2016 – 30/12/2020. [*Minerals 11 (2)*, 188; *Journal of Applied Crystallography 52 (3)*, 618-625; *Journal of Raman Spectroscopy 49 (6)*, 1023-1030]
5. Role: **Collaborative Research**, Dr. Daniel Nessim, Associate Professor, Bar Ilan University, Israel. [*Diamond and Related Materials 97*, 107433; *ACS Applied Nano Materials 1 (11)*, 6046-6054]
6. Role: **Collaborative Research**, Dr. Alessandro Romeo, Associate Professor, University of Verona, Italy. [*The Journal of Physical Chemistry C 125 (36)*, 19858–19865; *Solar Energy 193*, 452-457; *Coatings 7 (2)*, 34; *Solar Energy 139*, 13-18]
7. Role: **Collaborative Research**, Dr. Bipin Kumar Gupta, Principle Scientist, CSIR – National Physical Laboratory, New Delhi, India. [*Journal of Applied Physics 117 (24)*, 243104; *New Journal of Chemistry 39 (5)*, 3380-3387; *ACS Applied Materials & Interfaces 6 (11)*, 8407-8414; *RSC Advances 4 (98)*, 54936-54947].

### **Grants/ Fellowships/ Achievements:**

1. **Research Grant** award within EU ‘HORIZON 2020’ Project ‘BEFOREHAND’ - CNR-IMM, Milan, Italy (**Sep. 2019 - Present**).
2. **Post-Doctoral Fellowship** award within Polish NCN Grant Project ‘SONATA BIS’ on the Research topic entitled ‘**Raman spectroscopy of acoustic and optical phonons confined in colloidal II-VI nanocrystal heterostructures**’ - Wrocław University of Science and Technology, Wrocław, Poland (**Sep. 2019- March 2020**) Not Aailed.
3. **Research Grant** award within EU ‘HORIZON 2020’ Project ‘SOLSA’ - University of Verona, Italy (**Nov. 2017- Sep. 2019**).
4. **COPRINT (exit mobility) Grant** award by University of Verona, Italy to visit Bar Ilan University, Israel (**2017**).
5. **COST Action MP1302 Trainee Grant** award to attend ‘Training School on Raman and Correlative Surface Analytics on Carbon Nanomaterial’s’ held at/by Natural and Medical Sciences Institute, University of Tübingen, & Center LISA+, Tübingen, Germany (**2016**).
6. **Travel Grant** to attend ‘International School on Fundamental Crystallography with applications to Electron Crystallography’ held at/by Antwerp Summer University, University of Antwerp, Antwerp, Belgium (**2016**).
7. **Travel Grant** award to attend ‘Laser Lab Europe User Community Training - the Regional Eastern-Europe Training School for Potential Users - Workshop on Light-Based Technologies’ held at/by International Laser Center, Bratislava, Faculty of Natural Sciences, University of Ss. Cyril and Methodius, Trnava, Slovakia (**2015**).
8. **Full Scholarship** - PhD in Physics, University of Rome, Tor Vergata, Italy by Ministry of Education, University and Research (MIUR), Italy (**2014-2017**) Not Aailed.
9. **Full Scholarship** - PhD in Nanoscience & Advanced Technologies, University of Verona, Italy by Ministry of Education, University and Research (MIUR), Italy (**2014-2017**).

### Scientific Publications

#### 2021

1. E. Longo, L. Locatelli, M. Belli, M. Alia, **A. Kumar**, M. Longo, M. Fanciulli, R. Mantovan. Spin-charge conversion in Fe/Au/Sb<sub>2</sub>Te<sub>3</sub> as probed by spin pumping ferromagnetic resonance. **Advanced Materials Interfaces: Accepted. Manuscript ID: admi.202101244.R1.** <https://doi.org/10.1002/admi.202101244>
2. **A. Kumar**, V. Kumar, A. Romeo, C. Wiemer, G. Mariotto. Laser Raman Spectroscopy and *In-situ* XRD probing of the Thermal Decomposition of Sb<sub>2</sub>Se<sub>3</sub> thin film. **The Journal of Physical Chemistry C** 125 (36), (2021) 19858–19865. <https://doi.org/10.1021/acs.jpcc.1c05047>
3. **A. Kumar**, R. Cecchini, C. Wiemer, V. Mussi, S.D. Simone, R. Calarco, M. Scuderi, G. Nicotra, M. Longo. Self-Assembled GeTe/Sb<sub>2</sub>Te<sub>3</sub> Core-Shell Nanowires by MOCVD. **Coatings**. 11 (6), (2021) 718. <https://doi.org/10.3390/coatings11060718>
4. **A. Kumar**, R. Cecchini, L. Locatelli, C. Wiemer, C. Martella, L. Nasi, L. Lazzarini, R. Mantovan, M. Longo. Large-Area MOVPE Growth of Topological Insulator Bi<sub>2</sub>Te<sub>3</sub> Epitaxial Layers on i-Si(111). **ACS Crystal Growth & Design**. 21 (7), (2021) 4023–4029. <https://doi.org/10.1021/acs.cgd.1c00328>
5. **A. Kumar**, M. Cassetta, M. Giarola, M. Zanatta, M. Le Guen, G.D. Sorarù, G. Mariotto. Thermal Annealing and Phase Transformation of Serpentine-like Garnierite. **Minerals**. 11 (2), (2021) 188. <https://doi.org/10.3390/min11020188>
6. **A. Kumar\***. Natural Materials - Interesting candidates for Carbon Nanomaterials. **Physchem**. 1 (1), (2021) 4-25. <https://doi.org/10.3390/physchem1010002>

#### 2019

7. V. Kumar, E. Artegiani, **A. Kumar**, G. Mariotto, F. Piccinelli, A. Romeo. Effects of post-deposition annealing and copper inclusion in superstrate Sb<sub>2</sub>Se<sub>3</sub> based solar cells by thermal evaporation. **Solar Energy**. 193, (2019), 452-457. <https://doi.org/10.1016/j.solener.2019.09.069>
8. **A. Kumar**, Y. Kostikov, M. Zanatta, G. D. Sorarù, B. Orberger, G. D. Nessim, G. Mariotto. Carbon nanotubes synthesis using siliceous breccia as a catalyst source. **Diamond and Related Materials**. 97, (2019) 107433. <https://doi.org/10.1016/j.diamond.2019.05.018>
9. Y. Mendili, V. Antanas, A. Merkys, S. Grazulis, D Chateigner, F. Mathevet, S. Gascoin, S. Petit, J. Bardeau, M. Zanatta, M. Secchi, G. Mariotto, **A. Kumar**, M. Cassetta, L. Lutteroti, E. Borovin, B. Oberger, P. Simon, B. Hehlen, M. Guen. Raman Open Database: first interconnected Raman-XRD open-access resource for material identification. **Journal of Applied Crystallography**. 52, (2019) 618-625. <https://doi.org/10.1107/S1600576719004229>

#### 2018

10. **A. Kumar**, Y. Kostikov, B. Orberger, G.D. Nessim, G. Mariotto. Natural laterite as a catalyst source for the growth of carbon nanotubes and nanospheres. **ACS Applied Nano Materials**. 1 (11), (2018) 6046-6054. <https://doi.org/10.1021/acsanm.8b01117>
  11. M. Secchi, M. Zanatta, E. Borovin, M. Bortolotti, **A. Kumar**, M. Giarola, A. Sanson, B. Orberger, N. Daldosso, S. Gialanella, G. Mariotto, M. Montagna, L. Lutterotti. Mineralogical investigations using XRD, XRF and Raman spectroscopy in a combined approach. **Journal of Raman Spectroscopy**. 49, (2018) 1023-1030. <https://doi.org/10.1002/jrs.5386>
- 2017**
12. G.D. Sorarù, G. Kacha, R. Campostrini, A. Ponzoni, M. Donarelli, **A. Kumar**, G. Mariotto. The effect of B-Doping on the electrical conductivity of polymer-derived Si(B)OC ceramics. **Journal of the American Ceramic Society**. 100, (2017) 4611- 4621. <https://doi.org/10.1111/jace.14986>
  13. S.D. Mare, D. Menossi, A. Salavei, E. Artegian, F. Piccinelli, **A. Kumar**, G. Mariotto, A. Romeo. SnS thin film solar cells: Perspectives and Limitations. **Coatings**. 7 (2), (2017), 34. <https://doi.org/10.3390/coatings7020034>
- 2016**
14. A. Salavei, F. Piccinelli, D. Menossi, **A. Kumar**, G. Mariotto, S.D. Mare, E. Artegiani, A. Romeo. Comparison of high efficiency flexible CdTe solar cells on different substrates at low temperature deposition. **Solar Energy**. 139 (2016) 13-18. <https://doi.org/10.1016/j.solener.2016.09.004>
- 2015**
15. **A. Kumar**, G. Kedawat, P. Kumar, J. Dwivedi, B. K. Gupta. Sunlight-activated Eu<sup>2+</sup>/Dy<sup>3+</sup> doped SrAl<sub>2</sub>O<sub>4</sub> water resistant phosphorescent layer for optical displays and defence applications. **RSC New Journal of Chemistry**. 39 (5), (2015) 3380- 3387. <https://doi.org/10.1039/C4NJ02333A>
  16. B. K Gupta, **A. Kumar**, P. Kumar, J. Dwivedi, G. N. Pandey, G. Kedawat. Probing on green long persistent Eu<sup>2+</sup>/Dy<sup>3+</sup> doped Sr<sub>3</sub>SiAl<sub>4</sub>O<sub>11</sub> emerging phosphor for security applications. **AIP Journal of Applied Physics**. 117 (24), (2015) 243104. <https://doi.org/10.1063/1.4922983>
- 2014**
17. G. Kedawat, B. K. Gupta, P. Kumar, J. Dwivedi, **A. Kumar**, N.K. Agrawal, S.S. Kumar, Y. K. Vijay. Fabrication of a flexible UV band-pass filter using surface plasmon metal-polymer nanocomposite films for promising laser applications. **ACS Applied Materials & Interfaces**. 6 (11) (2014) 8407-8414. <https://doi.org/10.1021/am501307h>
  18. J. Dwivedi, P. Kumar, **A. Kumar**, Sudama, V.N. Singh, B.P. Singh, S. K. Dhawan, V. Shanker, B. K. Gupta. A Commercial approach towards fabrication of bulk and nano phosphors converted highly efficient white LEDs. **RSC Advances**. 4 (98), (2014) 54936-54947. <https://doi.org/10.1039/C4RA11318G>

2013

19. G.N. Pandey, **A. Kumar**. Materials photonic bandgap in heterostructure. **International Review of Applied Engineering Research**. 3 (5), (2013) 22-24. ISSN 2248-9967
20. G.N. Pandey, **A. Kumar**, K.B. Thapa. Frequency dependence effective refractive index of metamaterials by effective medium theory. **Advances in Electronic and Electric Engineering**. 3 (2), (2013) 179-184. ISSN 2231-1297

#### **Conference Proceeding Papers (Full Length Peer-Reviewed): 05**

21. **A. Kumar\***, R. Cecchini, C. Wiemer, V. Mussi, S.D. Simone, R. Calarco, Mario. Scuderi, G. Nicotra, M. Longo. MOCVD growth of Self-Assembled GeTe/Sb<sub>2</sub>Te<sub>3</sub> Core-Shell and Ge-rich Ge-Sb-Te Nanowires. **European Phase Change and Ovonic Symposium (E\PCOS) 2021**. 13-14.
22. C. Duée, B. Orberger,..G. Mariotto, M. Giarola, **A. Kumar**, N. Daldosso, ..K. Devaux. Combined mineralogy and chemistry on drill cores: challenging for on-line-real-time analyses. Proceedings of SGA 14<sup>th</sup> Biennial Meeting, **Mineral Resources to Discover**. 3, (2017) 1241-1244. ISBN: 978-2-9816898-0-1
23. S.D. Mare, A. Salavei, D. Menossi, F. Piccinelli, P. Bernardi, E. Artegiani, **A. Kumar**, G. Mariotto, A. Romeo. A study of SnS recrystallization by post deposition treatment. **IEEE Xplore, 43<sup>rd</sup> Photovoltaic Specialists Conference**. 16 (2016) 431-434. <https://doi.org/10.1109/PVSC.2016.7749627>
24. S.D. Mare, A. Salavei, D. Menossi, F. Piccinelli, E. Artegiani, **A. Kumar**, G. Mariotto, A. Romeo. Effects of temperature and post deposition annealing on SnS polycrystalline thin film growth. **32<sup>nd</sup> EU PVSEC 2016 Proceedings Paper**. 1BV.6.40 (2016) 263-266. <https://doi.org/10.4229/EUPVSEC20162016-1BV.6.40>
25. E. Artegiani, D. Menossi, S.D. Mare, A. Salavei, **A. Kumar**, G. Mariotto, A. Romeo. Study of MoOx back contact for low temperature CdTe solar cells on superstrate configuration. **32<sup>nd</sup> EU PVSEC 2016 Proceedings Paper**. 3CV.4.30 (2016) 1229-1232. <https://doi.org/10.4229/EUPVSEC20162016-3CV.4.30>

#### **Book Chapter: 01**

26. **A. Kumar\***. A brief Introduction to Nanomaterials and their Properties, in 'Recent Trends in Materials Research'. Ayushman Publication House Pvt Ltd. First Edition (2021) 51-75. ISBN: 978-93-5234-055-2

#### **Manuscript Under Submission/Preparation: 04**

27. L. Locatelli, **A. Kumar**, P. Tsipas, A. Dimoulas, R. Mantovan. Magnetotransport and ARPES studies of large-area Sb<sub>2</sub>Te<sub>3</sub> and Bi<sub>2</sub>Te<sub>3</sub> topological insulators grown by MOCVD on Si. (Under



Submission, **Physical Review B**).

28. **A. Kumar**, R. Cecchini, C. Wiemer, V. Mussi, S.D. Simone, R. Calarco, M. Scuderi, G. Nicotra, M. Longo. Phase Change Ge-rich Ge-Sb-Te/Sb<sub>2</sub>Te<sub>3</sub> core-shell Nanowires by Metal Organic Chemical Vapour Deposition. (Under Submission, **Nanomaterials**).
29. A. Mirshokraee, **A. Kumar\***, A. Lamperti, C. Wiemer. Structural and interface studies on the phase change GeTe/Sb<sub>2</sub>Te<sub>3</sub> and Ge-rich Ge-Sb-Te/Sb<sub>2</sub>Te<sub>3</sub> core-shell nanowires. (Under Preparation).
30. P. Tripathi, **A. Kumar**, C. Martella, M. Kumar, B.K. Gupta. Probing into carrier-carrier and carrier-phonon scattering in high quality SnS<sub>2</sub> single-crystal using ultrafast spectroscopy. (Under Preparation).

### **Research Highlights: 01**

1. **A. Kumar**, G. Kedawat, P. Kumar, J. Dwivedi, B.K. Gupta. ChemInform Abstract: Sunlight-Activated Eu<sup>2+</sup>/Dy<sup>3+</sup> Doped SrAl<sub>2</sub>O<sub>4</sub> Water Resistant Phosphorescent Layer for Optical Displays and Defence Applications. **ChemInform**. 46 (29), (2015) 29-010.

### **Speaking at National and International Conferences and Conventions**

#### **Invited/Delivered Talks/Lectures etc: 01**

1. **Invited Lecture** on the topic "Covid19: Impact on Research & Development and Response" at the International Webinar titled "Rapid Advancement & Strategies in Teaching Learning System Enhance Life Skill: New Vistas, New Challenges"; Apollo College, C.G. India, 10<sup>th</sup> -11<sup>th</sup> August 2020. Ref. No. - AC/DRG/Webinar 2020 (D).

#### **Papers Presented in Conferences/Seminars: 11**

2021

2. **A. Kumar\***, R. Cecchini, C. Wiemer, C. Martella, M. Longo, M. Scuderi, G. Nicotra, "Shape Controlled Self-Assembly of Core Shell Ge-Sb-Te/Sb<sub>2</sub>Te<sub>3</sub> Nanowires by MOCVD" for the CIMTEC 2022, 15th International Conference on Modern Materials and Technologies (Postponed to 2022 due to Covid-19 emergency), Montecatini Terme (Italy). **Accepted Oral**
3. **A. Kumar\***, R. Cecchini, C. Wiemer, V. Mussi, S.D. Simone, R. Calarco, Mario. Scuderi, G. Nicotra, M. Longo. MOCVD growth of Self-Assembled GeTe/Sb<sub>2</sub>Te<sub>3</sub> Core-Shell and Ge-rich Ge-Sb-Te Nanowires. European Phase Change and Ovonic Symposium (EPCOS) 2021. **Oral Presentation**.

2018

4. **A. Kumar\***, M. Zanatta, Y. Kostikov, G.D. Nessim, G. Mariotto. Research paper entitled "Carbon



nanotubes synthesis using natural limonite laterite as catalyst source” at Spring meeting of European- Materials Research Society (E-MRS), Strasbourg, France, (2018). **Abstract #65838.**

**Oral Presentation.**

**2017**

5. **A. Kumar\***. Research paper entitled “Growth of nano carbon using natural geological minerals as catalysts/precursors” at Seminar held at Department of Chemistry, Bar Ilan University, Ramat Gan, Israel, (2017) **Oral Presentation.**
6. **A. Kumar\***, M. Giarola, G. Mariotto, B. Orberger, X. Bourrat. Research paper entitled “Combined Raman and EDXS analyses on organic matter rich black shales: Testing instrumental configuration for On-Line-In-Mine-Real Time analyses” at AMAM-ICAM Conference, Taranto, Italy, (2017) **Poster Presentation.**
7. **A. Kumar\***, M. Giarola, N. Daldosso, G. Mariotto, A. Sanson, M. Montagna, M. Secchi, E. Borovin. Research paper entitled “Combined Raman and EDXS analyses on drill core samples” at AMAM-ICAM Conference, Taranto, Italy. 6 (2017) 53. [ISSN 2464-9147]. **Poster Presentation.**
8. M. Zanatta, N. Daldosso, M. Giarola, **A. Kumar\***, G. Mariotto, F. Saggioro. Research paper entitled “Micro Raman study of Pietra Ollare Artifacts: An insight on medieval commercial routes of North Italy” at AMAM-ICAM Conference, Taranto, Italy. 6 (2017) 99. [ISSN 2464-9147]. **Poster Presentation.**
9. **A. Kumar\***. Research paper entitled “Vibrational spectroscopy study of highly serpentinised dunite extracted from a New Caledonia geo-mineral site” at PhD Day, University of Verona, Verona, Italy, (2017) **Poster Presentation.**

**2016**

10. **A. Kumar\***. Research paper entitled “Micro-Raman investigation of the nanostructure evolution of Boron-doped SiOC powders after pyrolysis at high temperature” at PhD Day, University of Verona, Verona, Italy, (2016) **Poster Presentation.**

**2013**

11. G.N. Pandey, **A. Kumar\***. Research paper entitled "Materials photonic bandgap in heterostructure" at International Conference on Innovative Trends in Natural/Applied Sciences and Energy Technology for Sustainable Development (ITNASETSDS), New Delhi, India (2013) **Oral Presentation.**
12. G.N. Pandey, **A. Kumar\***, K. B. Thapa. Research paper entitled “Frequency dependence effective refractive index of metamaterials by effective medium theory” at Global Conference on Recent Trends in Electronic Communication Engineering, Power and Control (ECEPC), New Delhi, India (2013) **Oral Presentation.**

## **Conference Abstracts with Contributions: 10**

13. L. Locatelli, **A. Kumar**, R. Cecchini, M. Longo, E. Longo, M. Rimoldi, P. Tsipas, A. Dimoulas, R. Mantovan. Research Paper entitled “Magneto-transport and ARPES studies of large-area Sb<sub>2</sub>Te<sub>3</sub> and Bi<sub>2</sub>Te<sub>3</sub> topological insulators grown by MOCVD on Si”. International Conference on Magnetism (**INTERMAG**) **2021**, DC-01, 616.
14. L. Locatelli, G. Bierhance, O. Gückstock, **A. Kumar**, E. Longo, M. Alia, R. Cecchini, M. Longo, T. Kampfrath, R. Mantovan. Research Paper entitled “Evolution of the THz emission signal as a function of the interface quality between Fe and large-area topological insulator Sb<sub>2</sub>Te<sub>3</sub> on Si”. International Conference on Magnetism (**INTERMAG**) **2021**, DC-01, 628.
15. Y. E Mendili, A. Vaitkus, D. Chateigner,...M. Zanatta, M. Secchi, G. Mariotto, **A. Kumar**, L. Lutterotti, E. Borovin, M. Montagna, T. Bui, B. Orberger, M. L. Guen. Research Paper entitled “The SOLSA project: Combined techniques and databases for mineral identification”. XXII Meeting of the International Mineralogical Association, Melbourne Australia (**2018**) **IMA2018-1304**.
16. M. Cassetta, G. Delpech, S. Nomade, **A. Kumar**, M. Zanatta, G. Mariotto. Research Paper entitled “Raman investigation of K-feldspar rapakivi textures and their petrogenesis”. XIII International GeoRaman Conference, Catania, Italy (**2018**).
17. M. Secchi, M. Zanatta, E. Borovin, M. Bortolotti, **A. Kumar**, A. Sanson, B. Orberger, S. Gialanella, G. Mariotto, M. Montagna, L. Lutterotti. Research Paper entitled “Ni laterites characterization using a combined approach” XIII International GeoRaman Conference, Catania, Italy (**2018**).
18. H. Pillière, B. Orberger, G. Mariotto, M. Giarola, **A. Kumar**, N. Daldosso, M. Zanatta, A. Speghini, A. Sanson, L. Lutterotti, E. Borovin, M. Bortolotti, M. Secchi, M. Montagna,... K. Devaux. Research Paper entitled “3D Imaging on heterogeneous surfaces on laterite drill core materials”. Real Time Mining Conference, Amsterdam, Netherlands. 624 (**2017**) 44-45. [ISBN: **978-3-938390-41-2**].
19. S. Grazulis, G. Mariotto, M. Giarola, **A. Kumar**, N. Daldosso, M. Zanatta,..H. Nolte, P. Peter. Research Paper entitled “Efficient long-term open-access data archiving in mining industries”. Real Time Mining Conference, Amsterdam, Netherlands. 624 (**2017**) 141-142. [ISBN: **978-3-938390-41-2**].
20. D. Chateigner, L. Lutterotti, P...,G. Mariotto, M. Giarola, **A. Kumar**, N. Daldosso, M. Zanatta, ... M. Kadar, K. Devaux. Research Paper entitled “Combined analysis extended to Raman and IR spectroscopies: SOLSA EU Project”. Groupe Français de Spectroscopie Vibrationnelle (GFSV), Le Mans, France (**2017**).
21. M. Secchi, M. Zanatta, E. Borovin, M. Bortolotti, **A. Kumar**,..., B. Orberger,..., G. Mariotto, M.

Montagna, L. Lutterotti. Research Paper entitled “Expert mineralogical investigations using a combined approach”. Italian Meeting on Raman Spectroscopies and Non-Linear Optical Effects (GISR) Trieste, Italy (2017).

22. B. Orberger, C. Duée,..., **A. Kumar**, G. Mariotto,..., K. Devaux. Research paper entitled “Coupled mineralogy and chemistry on drill core samples: Benchmarking On-Line-Real-Time analyses”. AMAM-ICAM, Bari, Italy. 6 (2017) 70. [ISSN 2464-9147].

### **Conference's, Workshops, Summer & Training Schools Attended: 23**

1. European Phase Change and Ovonic Symposium (EPCOS) 2021, 13-15 September 2021.
2. Virtual Conference on ‘Topological Matter Conference’ within EU Horizon 2020 Projects ‘TOCHA’ and ‘SKYTOP’, ICREA/ICN2 (Spain) & N.C.S.R. Demokritos (Greece), June 28-July 1, 2021.
3. Online workshop on ‘SKYTOP: MOCVD Epitaxial Growth Technologies Workshop’ within EU Horizon 2020 project ‘SKYTOP’, AIXTRON, Germany. 11 June, 2021.
4. Online seminar on ‘Structural Analysis of Resistive Switching Devices’ CNR- IMM, Italy, 20 May, 2021.
5. National Workshop on "Challenges of Teaching Physics Laboratory Courses in Online Mode", Kalindi College, University of Delhi, India, 23-25 January 2021.
6. International online Faculty Development Programme on “Modeling, Simulation & Fabrication of Futuristic Semiconductor, MEMS and NEMS Devices”, Dept. of Electronics and Communications, KL Education Foundation, Guntur, Andhra Pradesh, India, 14-19 December 2020.
7. Online course on “Standard & Alternative Lithographies”, Instituto de Sistemas Optoelectrónicos y Microtecnología (UPM), Spain. 2-3 December 2020.
8. Aldo Armigliato SEM School in Materials Science, CNR - IMM, Bologna, Italy, 09-13 November 2020.
9. IWCM<sup>2</sup> (International Workshop on Characterization and Modeling of Memory devices), Politecnico di Milano, Milan, Italy, 3-4 October 2019.
10. E-MRS Spring Meeting 2018 - Strasbourg, France, 18-22 June 2018.
11. 2<sup>nd</sup> International Conference on Applied Mineralogy & Advanced Materials - 13<sup>th</sup> International conference on Applied Mineralogy, AMAM-ICAM, Bari, Italy, 05-09 June 2017.
12. Summer School on past, present & future of Mass Spectroscopy, University of Verona, Italy, 17-

21 October **2016**.

- 13.** Training School on Raman and Correlative Surface Analytics on Carbon Nanomaterial's, Natural and Medical Sciences Institute, University of Tuebingen, NMI & Center LISA+, Tübingen, Germany, 05-07 October **2016**.
- 14.** International School on Fundamental Crystallography with applications to Electron Crystallography, Antwerp Summer University, University of Antwerp, Antwerp, Belgium, 27 June - 02 July **2016**.
- 15.** 27<sup>th</sup> Indian-Summer School of Physics: Graphene-the Bridge between Low- and High energy Physics, Prague, Czech Republic, 14-18 September **2015**.
- 16.** Laser Lab Europe user Community Training the regional Eastern-Europe Training School for potential users, Workshop on light-based technologies, Trnava, Slovakia, 02-04 September **2015**.
- 17.** LUMINET Spring Workshop, Verona, Italy, 02-06 March **2015**.
- 18.** Half day Workshop on Recent Trends and Novel applications of Luminescence- RTNAL 2014, CSIR-National Physical Laboratory, New Delhi & Luminescence Society of India (Delhi Chapter), New Delhi, India, 29 May **2014**.
- 19.** International Conference on Recent Trends in Materials and Devices-ICRTMD, Amity University, New Delhi, India, 30-31 October **2013**.
- 20.** Global Conference on Recent Trends in Electronic Communication Engineering, Power and Control-ECEPC 2013, JNU, New Delhi, India, 07-08 September **2013**.
- 21.** International Conference on Innovative Trends in Natural/Applied Sciences and Energy Technology for Sustainable Development-ITNASETSD, JNU, New Delhi, India, 27-28 July **2013**.
- 22.** Internship Programme: Inspire-Innovation in Science Pursuit for Inspired Research, Amity University, New Delhi, India, 08-12 Jan. **2013**.
- 23.** National Workshop on Advanced Analytical Techniques in Research and Development, Amity University, New Delhi, India, 20-21 Dec. **2012**.

### **Memberships of Professional Bodies/Societies/Scientific Services:**

- 1.** Advisory Board Member - Raman Open Database (ROD).
- 2.** Topic Editor – MDPI Micromachines (2020 – Present).
- 3.** Review Editor – Frontiers in Materials (2021- Present), Reviewer Board Member MDPI Coatings (2020 - Present).

### **Scientific Reviewer of International Journals:**

Small, Coatings; Energies; Micromachines etc.

### **Research Collaboration: International/ National/ Intra-Department:**

1. Dr. Pramod Kumar, Associate Professor - IIIT Pragraj, India
2. Dr. Roberto Mantovan, Scientist – CNR-IMM, Agrate (Milan), Italy
3. Dr. Alessandro Romeo, Associate Professor, Department of Computer Science, University of Verona, Verona, Italy.
4. Dr. Bipin Kumar Gupta, Principal Scientist & Associate Professor (AcSIR), CSIR- National Physical Laboratory, New Delhi, India.

Date: 18-10-2021

Place: Milan, Italy