

# Curriculum Vitae

## 1. Personal Information

First Name                      Alexandros  
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Home address                    17 Noemvriou 32, Cholargos  
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Nationality                       Greek  
Date of birth                     07/02/1986

## 2. Education and qualifications

- 2017     **Ph.D in Applied Physics** from University Aut3noma of Barcelona (UAB)/ Catalan Institute of Nanoscience and Nanotechnology (ICN2). Thesis defense: 27/07/2017. Qualif: Excellent (highest grade from UAB). Supervisor: Dr. Francesc Alzina. Title: "*Characterization of nanostructured materials for thermal conduction and heat transfer control*".
- 2012     **M.Sc. program: "Microsystems and Nanodevices"**, National Technical University of Athens (NTUA)/School of Applied Mathematical and Physical Sciences, Greece. Title: "*Development of Photonic Devices and Sensors using Nanostructured Optical Materials*". Obtained 12/11/2012.
- 2011     **B.Sc Degree in Physics**, Department of Physics, National and Kapodistrian University of Athens (U.O.A), Greece. Area of study: Solid State Physics. Thesis Title: "*Detection of Cosmic Radiation*".

## 3. Professional research experience

- 11/2021-present     **MSC Postdoctoral fellow**, NCSR-D, Greece - Individual Fellowships 2021 | Marie Skłodowska-Curie Actions, Project: "*THERMIC- Local thermal and thermoelectric transport in 2D transition metal dichalcogenide based nanostructures and devices*".
- 02/2020-09/2021     **Postdoctoral researcher**, ICN2, (a) EU project: "*NANOPOLY - High-performance electronic components based on metamaterials*", (b) National project: "*SIP- Surface and interface reshaped phonon propagation and phonon coupling to photons*".
- 12/2017-09/2019     **Postdoctoral researcher**, Aut3noma University of Madrid, FET Open project: "*QuIET - Quantum Interference Enhanced Thermoelectricity*" - EU Horizon 2020 FET.
- 01//2017-04/2017     **Research Inter**, IBM Research center, Switzerland, project: "*Heat transport in two dimensional materials*", supervisor: Dr. Bernd Gotsmann.
- 01/2014-07/2017     **Ph.D student**, ICN2, European project: "*QuantiHeat - Quantitative scanning probe microscopy techniques for heat transfer management in nanomaterials and nanodevices*".
- 1/2012–12/2013     **Research assistant**, National Hellenic Research Foundation, Athens, Greece. National projects: (a) "*WelCOM - Wireless sensors for engineering asset life cycle optimal management*", (b) "*SESAMO - Sensors for Structural Monitoring*".

#### 4. Scholarships, Awards and Grants

- 2021 **Marie Skłodowska-Curie (MSC) Individual Fellowship**, Project: *"THERMIC- Local thermal and thermoelectric transport in 2D transition metal dichalcogenide based nanostructures and devices"*.
- 2020 **Best Ph.D thesis** (*"Premi Extraordinari de Doctorat 2016/2017"*) – awarded from Autònoma University of Barcelona, Thesis title: *"Characterization of nanostructured materials for thermal conduction and heat transfer control"*.
- 2017 **Competitive mobility allowance** through a scientific proposal (*"Severo-Ochoa, ICN2"*) for doctoral Internship at IBM Research – Zurich.
- 2012 **Best Master thesis** – Thomaideio Award of the National Technical University of Athens (NTUA), 2012. Thesis title: *"Development of Photonic Devices and Sensors using Nanostructured Optical Materials"*, M.Sc. program: "Microsystems and Nanodevices".

#### 5. Short stays, projects and schools

- 6/2017 Research stay in University of Lancaster (ULANC), UK, (project: thermal and mechanical measurements of metal covered self-assembled block copolymer thin films)
- 10/2017 Research stay in Center for Thermal Sciences (CETHIL) - Micro and Nano Scale Heat Transfer group, CNRS, France (project: Heat transport measurements in self-assembled block copolymer thin films)
- 2/2015 Summer school *"Les Houches School of Physics"*, University of Grenoble, Alpes, France
- 7/2014 8<sup>th</sup> International Summer School *"Nanosciences & Nanotechnologies, Organic Electronics & Nanomedicine"* (ISSON14), Thessaloniki, Greece.
- 5/2011 Graduate Internship at *"Nuclear Magnetic Resonance Laboratory"*, Institute of Material Science of NCSR "Demokritos" (IMEL), Athens, Greece.

#### 6. List of journal articles

1. **A. El Sachat**, S. Svatek, et al., *"Quantum thermopower in multi-layer contacts MoS<sub>2</sub>"* (on preparation)
2. P. Xiao, **A. El Sachat** et al. *"Heat locking and guiding using nanopatterned MoS<sub>2</sub>"* (submitted, December 2021).
3. D Saleta Reig, S Varghese, R Farris, A Block, JD Mehew, O Hellman, P Woźniak, M Sledzinska, **A El Sachat** et al., *"Unraveling heat transport and dissipation in suspended MoSe crystals from bulk to monolayer"* Advanced Materials (Accepted), <https://doi.org/10.1002/adma.202108352>.
4. **A. El Sachat** et al. *"Phonon dynamics and thermal conductivity of PtSe<sub>2</sub> thin films: Impact of crystallinity and film thickness on heat dissipation"*, arXiv preprint arXiv:2111.13395.
5. P. Xiao, E. Chavez-Angel, S. Chaitoglou, M. Sledzinska, A. Dimoulas, C.M. Sotomayor Torres and **A. El Sachat**, *"Anisotropic Thermal Conductivity of Crystalline Layered SnSe<sub>2</sub>"* Nano Letters 21 (21), 9172-9179, 2021.
6. S. Varghese, D. S Reig, J. D Mehew, A. Block, **A. El Sachat** et al., *"Fabrication and characterization of large-area suspended MoSe<sub>2</sub> crystals down to the monolayer"* J. Phys. Mater., 2021, 4 046001.
7. J. Spièce, C. Evangelis, A. Robson, **A. El Sachat**, et al., *"Quantifying thermal transport in buried semiconductor nanostructures via Cross-Sectional Scanning Thermal Microscopy"* Nanoscale, 2021, 13, 10829-10836.

8. **A. El Sachat et al.**, “Heat transport control and thermal characterization of low-dimensional materials: A review” *Nanomaterials* 2021, 11(1), 175.
9. S. Sandell, E. Chavez-Angel, **A. El Sachat**, et al., “Tutorial: Thermoreflectance techniques and Raman thermometry for thermal property characterization of nanostructures” *Journal of Applied Physics* 128, 131101 (2020)
10. **A. El Sachat et al.**, “Nanoscale mapping of thermal and mechanical properties of bare and metal-covered self-assembled block copolymer thin films”, *ACS Appl. Polym. Mater.* 2020, 2, 2, 487-496.
11. **A. El Sachat et al.**, “Crossover from ballistic to diffusive thermal transport in suspended graphene membranes”, *2D Materials*, 6, 2, 2019.
12. **A. El Sachat et al.**, “Thermal transport in epitaxial  $Si_{1-x}Ge_x$  alloy nanowires with varying composition and morphology”, *Nanotechnology*, 28, 50, 2017.
13. B. Graczykowski, **A. El Sachat et al.**, “Thermal conductivity and air convection losses in periodic porous silicon membranes at high temperatures”, *Nature Communication*, 8, 415, 2017.
14. **A. El Sachat et al.**, “Characterization of industrial coolant fluids and continuous ageing monitoring by wireless node - enabled fiber optic sensors”, *Sensors*, 17(3), 568 2017.
15. M. R. Wagner, B. Graczykowski, J. S. Reparaz, **A. El Sachat**, et al., “Two-Dimensional Phononic Crystals: Disorder Matters”, *Nano Letters*, 16 (9), 5661–5668, 2016.
16. M. Sledzinska, B. Graczykowski, M. Placidi, **A. El Sachat**, et al., “Thermal conductivity of  $MoS_2$  polycrystalline nanomembranes”, *2D Materials*, 3, 3 2016.
17. **A. El Sachat et al.**, “Assessment of Block and Random Copolymer Overlayers on Polymer Optical Fibers Toward Protein Detection Through Electrostatic Interaction”, *Journal of Polymer Science, Part B: Polymer Physics*, 53, 327-334, 2015.
18. L. Athanasekos, **A. El Sachat et al.**, “Amphiphilic diblock copolymer based multi-agent photonic sensing scheme”, *Journal of Polymer Science, Part B: Polymer Physics*, 52, 46-54, 2014.
19. L. Athanasekos, M. Vasileiadis, **A. El Sachat**, et al., “ArF excimer laser microprocessing of polymer optical fibers for photonic sensor applications”, *Journal of Optics*, 17, 1, 2014.
20. N. Aspiotis, **A. El Sachat et al.**, “Diffractive ammonia sensors based on sol-gel nanocomposite materials”, *Sensor Letters*, 11, 1-5, 2013.
21. N Aspiotis, **A. El Sachat**, et al., “Ultra low cost rapid prototyping of diffraction grating remote point gas sensors” *Key Engineering Materials* 543, 377-380.
22. L Athanasekos, N. Aspiotis, **A. El Sachat et al.**, “Novel approach for lysozyme detection employing block copolymer overlayers on plastic optical fibers ” *Key Engineering Materials* 543, 385-388.

## 8. Research book chapters

1. **A. El Sachat et al.**, “Multianalytes Gas Sensors by Soft Lithography Induced Gratings with Sol-Gel and Copolymers Nanocomposites”, Springer, NATO Science Series, Book title: Nanotechnology in the Security Systems (NSS), Part II, pp. 181-192, 2014.

## 9. Latest International conference talks (as presenting or main author)

1. **A. El Sachat** “Thermal and thermoelectric transport in low-dimensional materials using scanning probe microscopy” 1<sup>st</sup> Severo Ochoa Workshop on Phononics and Thermal Transport (SOPHOT2021), Barcelona, 18-19 October 2021. **(Invited talk, presenting author)**
2. E. Chavez-Angel, P. Xiao, S. Chaitoglou, M. Sledzinska, A. Dimoulas, C.M. Sotomayor Torres and **A. El Sachat** “Anisotropic Thermal Conductivity of Crystalline Layered  $SnSe_2$ ” Trends in Nanotechnology International Conference (TNT2021), 2021. **(Invited talk)**

3. P. Xiao, **A. El Sachat**, E. Chavez-Angel, C. M. Sotomayor Torres, and M. Sledzinska " *Tuning thermal conductivity of free-standing MoS<sub>2</sub> membranes* " Fall conference of the European Materials Research Society September 2021
4. E. Guen, **A. El Sachat**, W. Sun, P.-O. Chapuis, F. Alzina, C. M. Sotomayor-Torres, G. Hamaoui and S. Gomès, "*Local thermal analysis of polystyrene thin films on substrate*" 8<sup>th</sup> European Thermal Sciences Conference 6-10 September, 2020, Lisbon, Portugal.
5. G. Olsen, G. Yzambart, L. Rincón-García, I. Grace, **A. El Sachat**, *et al.*, "*Relationship between Structure and Single-molecule Conductance and Thermoelectric Properties of Dipyridylfluorene Derivatives*" International Conference on Molecular-Scale Charge and Thermal Transport, Engelberg, Switzerland, January 2020.
6. M. R. Wagner, B. Graczykowski, J. S. Reparaz, **A. El Sachat**, M. Sledzinska, F. Alzina, C. M. Sotomayor Torres, "*Limitation of Hypersonic and Thermal Phonon Coherence by Disorder and Roughness in 2D Phononic Crystals*", 4<sup>th</sup> International Conference on Phononic Crystals/Metamaterials, Phonon Transport/Coupling and Topological Phononics Changsha, China, June 4-June 9, 2017. **(Invited talk)**
7. C. M. Sotomayor-Torres, B. Graczykowski, F. Alzina, M. Sledzinska, J. S. Reparaz, **A. El Sachat**, M. R. Wagner, A. Shchepetov, M. Prunnila, J. Ahopelto, "Free-standing Silicon Membranes-based Phononic Crystals", at NM5: Nanomembrane Materials from Fabrication to Application symposium, 2016. **(Invited talk)**
8. **A. El Sachat**, B. Graczykowski, J. S. Reparaz, *et al.*, "*Tuning the temperature dependence of the thermal conductivity in silicon membranes by nanopatterning*", Eurotherm seminar 108 - Nanoscale and Microscale Heat Transfer V, Santorini, Greece, 2016. (presenting author)
9. **A. El Sachat**, E. Guen, *et al.*, "*Structural and thermal properties of bare and chromium-covered block copolymer*", Eurotherm seminar 108-Nanoscale and Microscale Heat Transfer V, Santorini, Greece, 2016. (presenting author)
10. **A. El Sachat**, F. Alzina, J. S. Reparaz, *et al.*, "*Structure, composition, and thermal properties of epitaxial Si<sub>1-x</sub>Ge<sub>x</sub> alloy nanowires studied by scanning thermal microscopy*" Workshop: "Nanothermal Measurements and heat transport", York, United Kingdom, 15-16 December 2015. **(invited talk, presenting author)**
11. **A. El Sachat**, J. S. Reparaz, B. Graczykowski *et al.*, "*Thermal conductivity of nanomembrane structures investigated using two-laser Raman thermometry*", European Materials Research Society (E-MRS) Fall Meeting, Warsaw (Poland), September 15-18, 2015. (presenting author)
12. **A. El Sachat**, C. Markos, P. Velanas, *et al.*, "*Assessment of fiber optic sensors for ageing monitoring of industrial liquid coolants*", MRS Spring meeting, Photonic West, California (US), 2015. (presenting author).

## 10. Commissions of trust

2016 - Present Regular peer reviewer in scientific journals (ACS nano, ACS Applied Materials and Interfaces, 2D Materials, Biosensors, Energies, Micromachines and Applied Sciences).

## 11. Other skills

**Languages:** Proficient in Greek (native), Proficient in English and Spanish. Nanofabrication skills: Handling of equipment for the whole chain of device fabrication: Thin films, self-assembled block copolymer films, exfoliation of 2D materials, electron beam evaporation, sputtering, photolithography, EBL, resist spin coating, etching (ICP and RIE), FIB, wet etching.

**Characterization skills:** Handling of numerous microscopy techniques (optical, AFM, SEM, TEM, XRD, helium and nitrogen handling, cryostat use, SPM techniques (S<sub>Th</sub>M, STM), Raman spectroscopy, two-laser Raman thermometry; design, building and usage of optical systems (frequency-domain thermoreflectance).

**Computing and simulation skills:** Optical system automation (Matlab); finite-elements simulations (COMSOL).