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Summary of Qualifications:

- ❖ Expertise in Condensed Matter Physics, Solid State Chemistry/Physics, Inorganic Chemistry, Transition Metal Oxides, Physical Chemistry and Chemical/Materials Engineering
- ❖ Extensive experience in studying novel materials: Narrow/Wide Gap Semiconductors, Strongly Correlated Electron Systems (manganites, cuprates, pnictides etc.), Superconductors, Topological Insulators
- ❖ Over ten years of experience in instrumental analysis and spectroscopy at UCLA, UCSB, TRIUMF (Canada), National Center of Scientific Research “Demokritos” (Greece), Instytut Chemii Organiczej Politechnika Lodzka (Poland) and ShanghaiTech University (China)
- ❖ Operation and maintenance of nuclear magnetic resonance (NMR) spectrometers
- ❖ NMR probe design & construction, NMR under extreme conditions: Low temperature NMR ($T < 5$ K) and High temperature NMR ($T > 700$ K, up to 1000 K), Cryostats (Oxford, Janis). Home-built broadband spectrometers & Bruker instrumentation. Cryogenics
- ❖ Expertise in various research techniques: High/ Low field NMR, MAS-NMR, NQR, EPR, Electrochemical Characterization techniques, Muon Spin Rotation, Beta-detected NMR spectroscopy

- ❖ Collaboration with established scientists worldwide to perform materials research (e.g. NHMFL, UCLA, Northwestern, TRIUMF, RWTH-Aachen)
- ❖ Journal Editorial and Advisory Board Member of Elsevier (Heliyon)
- ❖ Reviewer for peer-reviewed journals
- ❖ Grant/Proposal writing

Academic Positions:

- 2018-present **Research at the** Department of Physics, University at Buffalo, Buffalo
New York
- 2017 **Assistant Professor**, School of Physical Science and Technology
ShanghaiTech University, Shanghai, China
- 2012-2016 **Researcher (Postdoctoral)**, UCLA Dept. of Chemistry and
Biochemistry
- 2012-2016 **Visiting scientist** at “TRIUMF” Canada's national laboratory for
particle and nuclear physics, University of British Columbia,
Vancouver, Canada

Education:

- ❖ **Postdoctoral Researcher 2012-2016**, Dept. of Chemistry and Biochemistry,
University of California, Los Angeles (UCLA), USA
- ❖ **PhD 2011**, National Center for Scientific Research "DEMOKRITOS" and
National Technical University of Athens, Greece (*Highest Grade: 10/10*)
Dissertation: Nuclear magnetic resonance spectroscopy in strongly correlated
electron transition metal oxides with intrinsic nanophase regions

- ❖ **MSc 2007, Materials Science and Technology**, National Technical University of Athens, and National Center for Scientific Research "DEMOKRITOS".
(Honors/Grade: 9.19/10)

MSc Thesis: Nanostructures, Thin Solid Films and Exchange Biased Nanolayers (IrMn/NiFe/SiO) for Magnetic Applications

- ❖ **Diploma (MEng equivalent) 2006**, School of Chemical Engineering, National Technical University of Athens, Greece & Department of Materials Engineering, University of Trento, Italy.

Diploma Thesis (Italy & Greece): Properties of electrodeposited metal matrix micro and nano-composite coatings (Advisors: Prof. N. Kouloumbi, Prof. P-L. Bonora)

Diploma Practice (Poland): NMR spectroscopy at Institute of Organic Chemistry, Technical University of Lodz, Poland.

Research Experience:

2012-2017 **Visiting scientist** at "TRIUMF" Canada's national laboratory for particle and nuclear physics, University of British Columbia, Vancouver, Canada. β -NMR & μ -SR Laboratories

2012-2016 **Post-Doc**, Dept. of Chemistry and Biochemistry, University of California, Los Angeles, USA

2012 **Analytical Chemist and Chemical Engineer**, Physical Chemistry laboratory of Greek army (mandatory service).

2007-2011 **Doctoral researcher**, National Center for Scientific Research "DEMOKRITOS" Solid State Nuclear Magnetic Resonance Laboratory, and National Technical University of Athens

2011 **Visiting researcher**, Hahn-Meitner Institut, Helmholtz Zentrum

- Berlin “HZB”, Germany (IKY-DAAD collaboration)
- 2006-2007 **M.Sc. candidate and Teaching Assistant**, Unit of Nanoengineering & Nanotechnology (NanoLab), National Technical University of Athens, and Thin Films Laboratory National Center for Scientific Research "DEMOKRITOS". *Distinction*.
- 2005-2006 **Junior researcher (Diploma thesis)**, Laboratory of Industrial Corrosion Control, Dept. of Materials Engineering, University of Trento, Italy
- 2005 **Visiting scientist (IAESTE scholar)**, NMR Laboratory, Instytut Chemii Organiczej, Politechnika Lodzka, Poland
- 2004 **Chemical engineer (Internship)**, Fuel Technology and Lubricants Laboratory, NTUA

Membership in Professional Organizations:

- ❖ American Chemical Society (ACS)
- ❖ American Physical Society (APS)
- ❖ Materials Research Society (MRS)
- ❖ American Association for the Advancement of Science (AAAS)
- ❖ Technical Chamber of Greece
- ❖ Greek Association of Chemical Engineers

Teaching Experience:

- 2017 **Assistant Professor**, School of Physical Science and Technology ShanghaiTech University, Shanghai, China
- 2012-2016 **Mentoring and thesis supervision** of graduate and undergraduate students, UCLA Dept. of Chemistry and Biochemistry (UCLA graduate students/ international students from RTWH-Aachen)

2006-2012 **Mentoring and Teaching Assistant** (didactic and laboratory supervision) of undergraduate students for the Physical Chemistry, Thermodynamics and Electrochemistry Laboratories at School of Chemical Engineering (NTUA)

Research Interests and Core Competencies:

- ❖ Transition Metal Borides, Oxides, Narrow/Wide/Gapless Semiconductors, Strongly Correlated Electron Systems, Topological insulators, Dirac/Weyl Semimetals, Nanocatalysts, Superconductivity, Inorganic materials, Chalcogenides, Nanoscience, Strongly Correlated Electron Systems (Pnictides, Cuprates, Manganites)
- ❖ Instrumental analysis, Materials characterization, Spectroscopy, Electrochemistry, Nuclear Magnetic Resonance Spectroscopy (NMR), Beta-detected NMR spectroscopy (β -NMR), Muon Spin Rotation spectroscopy (μ SR)
- ❖ Band structure analysis and density of states calculations/comparison with spectroscopic methods

Presentations & Invited Speaker in Conferences/Workshops:

1. Nuclear Magnetic Resonance in Materials Science (Chemistry, Physics, Engineering). Missouri University S&T, Rolla 2017, USA.
2. NMR on Topological Insulators and Strongly Correlated Electron Systems. ShanghaiTech University, Pudong 2016, China.
3. Exchange Biased Nano-layers (IrMn/NiFe/SiO) for Magnetic Applications. 7th Panhellenic Conference on Chemical Engineering. Patra 2009, Greece.
6. Direct Chemical-Fine Tuning of Electronic and Magnetic Properties in Intermetallic Borides. Seaborg Symposium, Los Angeles 2016, USA.
7. The NMR and Neutron Scattering signature of charge and spin stripes in $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$ ($x>0.5$) manganites. Striking similarities and differences with

underdoped $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ cuprates. Third North America-Greece-Cyprus Workshop on Paramagnetic Materials. Protaras 2009, Cyprus.

8. Nuclear Magnetic Resonance in overdoped manganites. Evidence about the presence of slow fluctuating charge and spin superstructure. 7th Workshop on Orbital Physics and Novel Phenomena in Transition Metal Oxides. Helmholtz Zentrum, Berlin 2009, Germany.

9. Nuclear Magnetic Resonance Spectroscopy in strongly correlated electron transition metal oxides with intrinsic nanophase regions. 7th Panhellenic Conference on Chemical Engineering, Patra 2009, Greece.

10. ^{139}La NMR study reveals peculiar spin ordering and antiferromagnetism in the overdoped region of $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$ phase diagram. XXV Panhellenic Conference on Solid State Physics & Materials Science, Thessaloniki 2009, Greece.

Publications in Peer Reviewed Journals:

1. Turner CL, **Koumoulis D**, Li G, Zujovic Z, Taylor RE, Kaner RB, Synthesis and characterization of aluminum diboride products using ^{27}Al , ^{11}B NMR and ab initio studies, *Journal of Materials Science* 53(5) (2018)

2. McFadden RML, Buck TJ, Chatzichristos A, Chia-Chin Chen, Chow KH, Cortie D, Dehn M, Karner VL, **Koumoulis D**, Levy PCD, Chilin Li, McKenzie I, Merkle R, Morris GD, Pearson MR, Salman Z, Samuelis D, Stachura M, Jiyu Xiao, Maier J, Kiefl RF, MacFarlane WA, Microscopic Dynamics of Li^+ in Rutile TiO_2 Revealed by ^8Li β -Detected Nuclear Magnetic Resonance, *Chem. Mater.* 29 (23), 10187–10197 (2017)

3. Pissas M, **Koumoulis D**, Specific heat study of $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$ ($0.5 \leq x \leq 0.9$) with antiferromagnetic ground state, *Journal of Applied Physics* 122, 143902 (2017)

4. Turner CL, Zujovic Z, **Koumoulis D**, Taylor RE, Kaner RB, ^{11}B NMR Study of WB_2 , *J. Phys. Chem. C* 121 (2),1315–1320 (2017)
5. **Koumoulis D**, Kupers M, Touzani R, Zhang Y, Fokwa BPT, Bouchard LS, Cr_3 Triangles induced competing magnetic interactions in the new metal boride $\text{TiCrIr}_2\text{B}_2$: An NMR and DFT study, *Mater. Res. Bull.* 100, 91-96 (2017)
6. **Koumoulis D**, Taylor RE, McCormick J, Ertas YN, Pan L, Che X, Wang KL, Bouchard LS, Effects of Cd vacancies and unconventional spin dynamics in the Dirac semimetal Cd_3As_2 , *J. Chem. Phys.* 147, 084706 (2017)
7. **Koumoulis D**, Scheifers JP, Touzani R, Fokwa BPT, Bouchard LS, Pseudogap formation and vacancy ordering in the new perovskite boride $\text{Zr}_2\text{Ir}_6\text{B}$, *Acta Materialia* 120, 32-39 (2016)
8. **Koumoulis D**, Scheifers JP, St. Touzani R, Fokwa BPT, Bouchard LS, Direct Chemical Fine-Tuning of Electronic Properties in $\text{Sc}_2\text{Ir}_{6-x}\text{Pd}_x\text{B}$, *ChemPhysChem* 17, 2972-2976 (2016)
9. **Koumoulis D**, Turner CL, Zujovic Z, Taylor RE, Kaner RB, ^{11}B NMR Spectral and Nuclear Spin-Lattice Relaxation Analyses of ReB_2 , *J. Phys. Chem. C* 120 (5), pp 2901–2907 (2016)
10. **Koumoulis D**, Morris GD, He L, Kou X, King D, Wang D, Hossain MD, Wang KL, Fiete GA, Kanatzidis MG, Bouchard LS, Nanoscale β -nuclear magnetic resonance depth imaging of topological insulators, *Proc. Natl. Acad. Sci. USA* 112, E3645-E3650 (2015)
11. **Koumoulis D**, Taylor RE, Revisiting $\text{NH}_4\text{H}_2\text{PO}_4$: ^1H MAS, CRAMPS, and Spin-Lattice Relaxation, *J. Phys. Chem. C* 119 (24),13836–13840 (2015)
12. Chasapis TC, **Koumoulis D**, Leung B, Calta NP, Lo SH, Dravid VP, Bouchard LS, Kanatzidis MG, Two-band model interpretation of the p - to n -transition in ternary tetradymite topological insulators, *APL Materials* 3, 083601 (2015)

13. **Koumoulis D**, Chasapis T, Leung B, Taylor RE, Stoumpos CC, Calta NP, Kanatzidis MG, Bouchard LS, Site-Specific Contributions to the Band Inversion in a Topological Crystalline Insulator, *Adv. Electr. Mater.* **1**, 1500117 (2015)
14. MacFarlane WA, Tschense CBL, Buck T, Chow K, Cortie DL, Hariwal AN, Kiefl RF, **Koumoulis D**, Levy C, McKenzie I, McGee F, Morris GD, Pearson MR, Song Q, Wang D, Hor Y, Cava RJ, β -detected NMR of $^8\text{Li}^+$ in Bi, Sb, and the topological insulator $\text{Bi}_{0.9}\text{Sb}_{0.1}$, *Phys. Rev. B* **90**, 214422 (2014)
15. **Koumoulis D**, Taylor TE, King Jr D, Bouchard LS, NMR study of native defects in PbSe, *Phys. Rev. B* **90**, 125201 (2014)
16. **Koumoulis D**, Leung B, Chasapis TC, Taylor R, King Jr D, Kanatzidis MG, Bouchard LS, Understanding bulk defects in topological insulators from nuclear-spin interactions, *Adv. Func. Mater.* **24**, 1519-1528 (2014)
17. Taylor R, Alkan F, **Koumoulis D**, Lake M, King D, Dybowski C, Bouchard LS, A combined NMR and DFT study of narrow gap semiconductors: The case of PbTe, *J. Phys. Chem. C* **117**, 8959-8967 (2013)
18. **Koumoulis D**, Chasapis TC, Taylor RE, Lake MP, King D, Jarenwattananon NN, Fiete GA, Kanatzidis MG, NMR probe of metallic states in nanoscale topological insulators, *Phys. Rev. Lett.* **110**, 026602 (2013)
19. Panopoulos N, **Koumoulis D**, Diamantopoulos G, Belesi M, Fardis M, Pissas M, Papavassiliou G, Spin order and lattice frustration in optimally doped manganites: A high-temperature NMR study, *Phys. Rev. B* **82**, 235102 (2010)
20. **Koumoulis D**, Panopoulos N, Reyes A, Fardis M, Pissas M, Douvalis A, Bakas T, Argyriou DN, Papavassiliou G, Direct NMR evidence of phase solitons in the spin ground state of overdoped manganites, *Phys. Rev. Lett.* **104**, 077204 (2010)

21. Papavassiliou G, Argyriou D, Panopoulos N, **Koumoulis D**, Boukos N, Fardis M, Pissas M, Hae Jin Kim, Jin-Gyu Kim, MHz Broadline NMR and HRTEM in the Study of Novel Strongly Correlated Electron Materials, JAST 2, A31-A37 (2011)
22. Lekka M, **Koumoulis D**, Kouloumbi N, Bonora PL, Mechanical and anticorrosive properties of copper matrix micro- and nano-composite coatings, Electrochimica Acta 54, 2540-2546 (2009)
23. Turner CL, Zujovic Z, **Koumoulis D**, Taylor RE, Kaner RB, Microscopic Investigation of Local Structural and Electronic Properties of Tungsten Tetraboride: A Superhard Metallic Material (*submitted to Journal of Materials Science, Springer*) 2018
24. Panopoulos N, Fardis M, Alhassan SM, Katsiotis MS, Tzitzios V, Kim HJ, Papavassiliou W, Anastasiou A, Gournis D, Taylor RE, **Koumoulis D**, Boukos N, Karagianni M, Pillai V, Karagiannis T, Stephen S, Maris TG, Papavassiliou G, ^{31}P NMR Nanocrystallography: Visualizing the size-induced structural and electronic changes at the surface of the HER nanocatalyst Ni_2P (*to be submitted*)

Conference Papers and Proceedings:

1. The NMR and Neutron Scattering signature of charge and spin stripes in $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$ ($x > 0.5$) manganites. Striking similarities and differences with underdoped $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ cuprates. Third North America-Greece-Cyprus Workshop on Paramagnetic Materials, 2009, Lemesos, Cyprus
2. Nuclear Magnetic Resonance in overdoped manganites. Evidence about the presence of slow fluctuating charge and spin superstructure. 7th Workshop on Orbital Physics and Novel Phenomena in Transition Metal Oxides, Helmholtz Zentrum Berlin 2009, Berlin, Germany

3. Mechanical and Anticorrosive properties of copper matrix micro and nano-composite coatings. Nanotechnology and Innovative Coatings Euro Interfinish, International Conference, 2007 Athens, Greece
4. Phase Solitons in the Spin Ground State of Overdoped Manganites. Physics of Complex Oxides, 14-17 June 2010 Santorini, Greece
5. Phase Solitons in the Spin Ground State of Overdoped Manganites. Direct NMR Evidence. Current Trends on Mesoscopic and Nanoscopic Magnetic Materials, , 24-29 June 2010, Orlando, United States
6. Phase Solitons in the Spin Ground State of Overdoped Manganites. Direct NMR Evidence. EUROMAR 2010 and 17th ISMAR Conference, 4-9 July 2010, Florence, Italy
7. Direct NMR evidence for phase solitons in the spin ground state of overdoped manganites. European Magnetic Symposia, 23-28 August 2010, Krakow, Poland
8. Stripes and Phase Solitons in Overdoped Manganites. A NMR Study 4th International Conference on Micro-Nanoelectronics, Nanotechnologies and MEMS 2010, Athens, Greece
9. Nuclear Magnetic Resonance Spectroscopy in strongly correlated electron transition metal oxides with intrinsic nanophase regions. 7th Panhellenic Conference on Chemical Engineering, Patra 2009, Greece
10. ^{139}La NMR study reveals peculiar spin ordering and antiferromagnetism in the overdoped region of $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$ phase diagram. XXV Panhellenic Conference on Solid State Physics & Materials Science, Thessaloniki 2009, Greece
11. NMR detection of phase solitons in electron-doped manganites. XXVI Panhellenic Conference on Solid State Physics & Materials Science, Ioannina 26-29 September 2010, Greece
12. Phase Solitons in the Spin Ground State of Overdoped Manganite. XXVI Panhellenic Conference on Solid State Physics & Materials Science, Ioannina 26-29 September 2010, Greece

13. Structural Investigation of Optimal Doped Manganites at High Temperature NMR. XXV Panhellenic Conference on Solid State Physics & Materials Science, Thessaloniki 2009, Greece
14. Exchange Biased Nano-layers (IrMn/NiFe/SiO) for Magnetic Applications. 7th Panhellenic Conference on Chemical Engineering, Patra 2009, Greece
15. Spin order and lattice frustration in optimally doped manganites. XXVI Panhellenic Conference on Solid State Physics & Materials Science, Ioannina 26-29 September 2010, Greece
16. Preparation and Characterization of composite Copper matrix micro and nano-SiC coatings. 3rd Panhellenic Conference on Metallic Materials, University of Patra, 2007, Greece
17. Properties of electroplated copper metal matrix micro- and nano-composite coatings. 6th Panhellenic Conference on Chemical Engineering, June 2007, Athens, Greece
18. NMR investigation of strongly correlated electron systems. "Demokritos" Annual Doctorate Research Day. January 2011, Athens, Greece
19. Solid state nanoscale NMR imaging of topological insulators. MESO Review meeting (DARPA meeting). August 2013, Washington, USA
20. Topological Band Structures Probed by NMR. Rocky Mountain Conference on Magnetic Resonance. July 2016, Colorado, USA
21. A high temperature NMR study in optimally doped manganites. 7th Workshop on Orbital Physics and Novel Phenomena in Transition Metal Oxides, Helmholtz Zentrum Berlin 2009, Germany