

# Alexander Tarantul

Physical Chemistry, Physics, Signal Processing

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## Education:

2005-2009 - PhD, Chemistry Department, Ben-Gurion University  
1997- 2001 - M.Sc. in Electrical Engineering, Ben-Gurion University  
1992-1995 - B.Sc. in Physics (cum laude), Ben-Gurion University

**Current research interests:** molecular magnetism, exchange and vibronic interactions in the clusters of transition metal ions, relaxation phenomena, physical chemistry, quantum chemistry, computational chemistry.

**Secondary Area of Expertise:** Digital signal and image processing, target acquisition, pattern recognition.

## Work experience:

2009 - Present PostDoc Fellow, Chemistry Department, Ben-Gurion University  
2001 - Present Lecturer and Instructor, Department of Software Engineering, Sami Shamoon Engineering College, Beer –Sheva and Ashdod  
2010 – Present Lecturer, Kaye College of Education, Beer-Sheva  
2005 -2009 PhD researcher, Chemistry Department, Ben-Gurion University  
Research project: “*Theoretical modeling of the exchange interactions and related phenomena in nanoscopic magnetic materials*”  
(Supervisor: Prof. B.Tsukerblat).  
2006 -2009 Teaching Assistant, Chemical Department, Ben-Gurion University  
Apr.- Sept.2005 Research Assistant, Chemical Department, Ben-Gurion University  
1998 – 2001 M.Sc. researcher , Department of Electrical Engineering, Ben-Gurion University. Research  
1998 – 2001 Instructor in the Electronic Devices Teaching Laboratory, Department of Electrical Engineering, Ben-Gurion University .

## Army Service:

1995 – 1997, Ordnance, Sergeant

## Courses Taught:

Ben-Gurion University: Physical Chemistry Courses: Thermodynamics, Kinetics, Advanced Kinetics and Electrochemistry

Kaye College: Physics

Sami Shamoon Engineering College: Engineering Mathematics (Random Signals, Signal Processing and others)

## Computer Programming Experience:

Very good knowledge of MATLAB;

Knowledge of the Wolfram *Mathematica*, C.

Familiarity with Assembler, Java, LISP, Perl, PROLOG, FORTRAN;

Familiarity with Network Programming in Java and Web Applications: cgi, Java Servlets.

## List of publications:

### Chapters in the books:

1. B. Tsukerblat, **A. Tarantul**, *The nanoscopic  $V_{15}$  cluster: a unique magnetic polyoxometalate*, In: *Molecular Cluster Magnets*, Chapter 3, Ed. R. Winpenny, World Scientific Publishers, Singapore, 2011, pp. 109-180

### Papers:

2. V. V. Maslyuk, I. Mertig, O. V. Farberovich, **A. Tarantul**, B. Tsukerblat, Electronic and Spin Structures of Polyoxometalate  $V_{15}$  from a First-Principles Non-Collinear Molecular-Magnetism Approach, *Eur. J. Inorg. Chem.*, (2013),  
online <http://onlinelibrary.wiley.com/doi/10.1002/ejic.201201202>
3. **A. Tarantul**, B. Tsukerblat, Direct and two-phonon Orbach-Aminov type spin-lattice relaxation in molecular magnet  $V_{15}$ , *J. of Phys.: Conference Series*, 324 (2011) 012007
4. **A. Tarantul**, B. Tsukerblat, Magnetic relaxation in  $V_{15}$  cluster: direct spin-phonon transitions, *Inorg. Chim. Acta*, 363 (2010) 4361
5. **A. Tarantul**, B. Tsukerblat, A. Müller, Field induced crossover in antiferromagnetic frustrated clusters: influence of static and dynamic structural deformations, *J. Mol. Str.*, 890 (2008) 170
6. **A. Tarantul**, B. Tsukerblat, A. Müller, Crossover of the magnetic sublevels in frustrated clusters: the role of static and dynamic deformations, *Solid State Sciences*, 10 (2008) 1814
7. N. Zamstein, **A. Tarantul**, B. Tsukerblat, Magnetic excitations in  $Cu_6$  and  $Mn_6$  hexagons embedded in  $D_{3d}$ -symmetric polyoxotungstates, *Inorganic Chemistry*, 46(21) (2007) 8851-8858
8. B. Tsukerblat, **A. Tarantul**, A. Müller, Antisymmetric exchange and pseudo Jahn-Teller instability in spin-frustrated metal clusters, *J. Mol. Structure*, 838 (2007) 124-132
9. **A. Tarantul**, B. Tsukerblat, A. Müller, Static magnetization of  $V_{15}$  cluster at ultra-low temperatures: precise estimation of antisymmetric exchange, *Inorganic Chemistry*, 46(1) (2007) 161-169.
10. **A. Tarantul**, B. Tsukerblat, A. Müller, High-field magnetization of  $V_{15}$  at ultra-low temperatures: estimation of the antisymmetric exchange, *Chem. Phys. Lett.*, 428 (2006) 361-366.
11. B. Tsukerblat, **A. Tarantul**, A. Müller, Low temperature EPR spectra of the mesoscopic

cluster V<sub>15</sub>: the role of antisymmetric exchange, *J. Chem. Phys.*, 125 (2006) 0547141-0547149.

12. B. Tsukerblat, **A. Tarantul**, A. Müller, Crossover of the magnetic levels and adiabatic magnetization of the mesoscopic cluster V<sub>15</sub>, *Physics Letters A* 353 (2006) 48–59.

### Conference proceedings:

- A. Tarantul**, B. Tsukerblat, A. Müller, Nanometer-Scale Molecular Cluster V<sub>15</sub>: EPR and Adiabatic Magnetization, *Proceedings of the 4<sup>th</sup> International Conference on Mathematical Modeling and Computer Simulation of Materials Technologies*, Vol.1, pp. 103-120 (2006), Ariel, Israel.
- B. Tsukerblat, **A. Tarantul**, N. Zamstein, M.I. Belinsky, S.I. Klokishner, A.Palii, S.M. Ostrovsky, O.S. Reu, A. Fishman, V. Mitrofanov, Nanosize molecular magnets: Application of irreducible tensor operator technique, *Sixth Israeli-Russian Bi-National Workshop 2007 "Optimization of the Composition, Structure and Properties of Metals, Oxides, Composites, Nano and Amorphous Materials"*, *Book of Proceedings*, pp173-196.

### Presentations at the Conferences:

**A. Tarantul**, B. Tsukerblat, Study of the Decoherence Processes in V<sub>15</sub> Cluster: Spin-Phonon Relaxation, *The Annual Meeting of the Israel Chemical Society*, Tel-Aviv, February 9, 2011

**A. Tarantul**, B. Tsukerblat, A. Müller, Molecular magnet V<sub>15</sub>: on the border of quantum and classical worlds, *The 53<sup>rd</sup> Annual Meeting of the Israel Physical Society*, Weizmann Institute of Science, Israel, December 9, 2007 (**contributed lecture**).

N.Zamstein, **A. Tarantul**, B. Tsukerblat, Magnetic excitations and EPR of Cu<sub>6</sub> hexagons embedded in D<sub>3d</sub>-symmetric polyoxotungstates, *International Symposium "Magnetic Resonance in Condensed Matter"*, Book of Abstracts, pp.38-39, Chisinau, Moldova, October 11-12, 2007

B. Tsukerblat, **A. Tarantul**, A. Müller, Nanoscopic cluster V<sub>15</sub>: spin frustration and antisymmetric exchange, *Seventh International Symposium On Crystalline Organic Metals, Superconductors And Ferromagnets (ISCOM2007)*, Peñíscola, Spain, September 24-29, 2007

**A. Tarantul**, B. Tsukerblat, A. Müller, Magnetic Exchange Interactions in the Molecular Magnet V<sub>15</sub>, *Minerva Foundation Symposium "Nano-, Macro-, and Supra-Molecular Materials and Phenomena"*, Kibbutz Chafetz Chaim, 18-19 September, 2007 (**contributed lecture**).

B. Tsukerblat, **A. Tarantul**, N. Zamstein, S.I. Klokishner, A.Palii, S.M. Ostrovsky, O.S. Reu, A. Fishman, V. Mitrofanov, Nanosize molecular magnets: applications of the Irreducible tensor operator technique, *Sixth Israeli-Russian Bi-National Workshop 2007 "Optimization of the Composition, Structure and Properties of Metals, Oxides, Composites, Nano and Amorphous Materials"*, Jerusalem, 24 -28 June, 2007.

B. Tsukerblat, **A. Tarantul**, A. Müller, Mesoscopic cluster  $V_{15}$ : magnetic and vibronic Interactions, *International Symposium on the Jahn-Teller effect: Novel aspects in orbital Physics and vibronic dynamics of molecules and crystals*, 28 - 31 August, 2006, Trieste, Italy, Abstracts: <http://agenda.ictp.it/smr.php?1768> (**plenary invited**).

**A. Tarantul**, B. Tsukerblat, A. Müller, Nanometer-Scale Molecular Cluster  $V_{15}$ : EPR and Adiabatic Magnetization, *the 4<sup>th</sup> International Conference on Mathematical Modeling and Computer Simulation of Materials Technologies*, Ariel, 11-15 September, 2006 (**plenary**)

### **Participation in the Research Projects:**

- “Study of the magnetic exchange and electron delocalization in nano-size molecule based materials: from synthesis of giant metal clusters to single molecule magnets” *German- Israeli Foundation for scientific research and development (GIF)*, 2005-2007.
- “Study of cyanide-based clusters containing orbitally degenerate metal ions: from synthesis to new multifunctional optical and magnetic materials” *Binational US-Israeli Science Foundation (BSF)*, 2006-2010
- “Molecular magnets for quantum computing: problem of spin relaxation and coherence” *Israel Scientific Foundation (ISF)*, 2009-2012

### **Awards**

2007 Sharib Excellency Prize, Chemistry Department, Ben-Gurion University