ISAAC BALBERG January 2015

PUBLICATIONS

h-index: (GOOGLE) 43, (ISI) 38

300 papers

citations ≈ 7000 (GOOGLE), ≈ 6000 (ISI)

Five most cited papers

Excluded Volume and its Relation to the Onset of Percolation, I. Balberg, C.H. Anderson, S. Alexander and N. Wagner, Phys. Rev. B **30**, 3933-3942 (l984). (Google 610, ISI 471)

Deposition of Device Quality, Low H Content Amorphous Silicon, A.H. Mahan, J. Carapella, B.P. Nelson, R.S. Crandall and I. Balberg, J. Appl. Phys. **69**, 6728-6730 (1991). (Google 500, ISI 366)

Tunneling and Nonuniversal Conductivity in Composite Materials, I. Balberg, Phys. Rev. Letters, **59**, 1305-1309 (l987). (Google 358, ISI 299)

Percolation Thresholds in the Three-Dimensional Sticks System, I. Balberg, N. Binenbaum and N. Wagner, Phys. Rev. Letters **52**, 1465-1468 (1984). (Google 322, ISI 263)

A Computer Study of the Percolation Threshold in a Two-Dimensional Anisotropic System of Conducting Sticks, I. Balberg and N. Binenbaum, Phys. Rev. B **28**, 3799-3812 (l983). (Google 280, ISI 212)

Invited Chapters in Books

The Theory of the Photoconductance under the Presence of a Small Photocarrier Grating, I. Balberg, invited chapter in *Photoconductivity*, N.V. Joshi, Editor (SPIE, Bellingham, 1992) p. 595.

Surface States on Hydrogenated Amorphous Silicon, Invited Review Paper, I.Balberg, Y. Goldstein and A. Many, in Solid State Phenomema: *Hydrogenated Amorphous Silicon, H. Neber-Aeschbacher, Editor*, 44-46, 791-818 (1995), (Scitec, Zug, 1995).

Resistivity and Electrical Noise in Continuum Percolation, I. Balberg, Invited review paper, in *Trends in Statistical Physics*, Vol. **2** pp.39-68, B. Chirikov, A. De Masi, J.

Fritz, S. Havlin, V. Privman and H. Spohn, Editors (Research Trends, Poojapora, 1998).

The Electronic Properties of Nano, Micro and Amorphous Silicon, I. Balberg, invited paper, in *Properies and Applications of Amorphous Materials*, NATO ASI Series, Edited by M.F. Thorpe and L. Tichy (Kluwer, Dodrecht, 2001), pp. 251-260.

The Statistical Physics of Continuum Percolation, A. Drory and I. Balberg, invited review chapter, in *Trends in Statistical Physics*, Vol. **3** pp. 45-73, B. Chirikov, A. De Masi, J. Fritz, S. Havlin, V. Privman and H. Spohn, Editors (Research Trends, Poojapora, 2000).

Continuum Percolation, I. Balberg, invited chapter in volume 2, M. Sahimi Editor, of the Springer Encyclopedia of Complexity, R. A. Myers, Editor in Chief (Springer, New York, 2009), pp. 1443-1475.

I. Balberg, Electrical Transport Mechanisms in Ensembles of Silicon Nanocrystals, Invited chapter in *Silicon Nanocrystals*, L. Pavisi and R. Turan, Eds. (Wiley-Vch, Weinheim, 2010), pp. 69-104.

Percolation theory and its application in electrically conducting materials, I. Balberg, invited chapter in *Semiconductor Polymer Composites*, X. Yang, Editor (Wiley, Berlin, 2012), pp. 145-169.

Manifestation of the Quantum Confinement Effect in Phototransport Properties of Ensembles of Semiconductor Quantum Dots, I. Balberg, invited chapter in *Nanostructured Semiconductors from basic research to applications*, P. Granitzer and K. Rumf, Editors, (Pan Stanford, 2014) pp. 319-391.

Invited articles in journals

Simple Test for Double Injection Initiation of Switching, I. Balberg, Invited Paper, the Physical Society of Japan, published in *"Series of Selected Papers in Physics"*, pp. 116-118, (The Physical Society of Japan, Tokyo, 1971).

Energy Conversion by Photoelectrochemical Cells, Principles and Applications, I. Balberg, Invited paper, Vacuum 33, 579-583 (l983).

Percolation Theory and its Application to Groundwater Hydrology, B. Berkowitz and I. Balberg, invited review paper, J. Water Resources Research, 29, 775 (1993).

A Comprehesive Picture of the Electrical Transport phenomena in Carbon Black-Polymer Composites, I. Balberg, selected paper of the 3rd Int. Conf. on Carbon Black Mulhouse, October 2000, published in Carbon **40**, 139-143 (2002).

Percolation and Tunneling in Composite Materials, I. Balberg, D. Azulay, D. Toker and O. Millo, invited review paper, International Journal of Modern Physics B, **18**, 2091-2121 (2004).

The Effect of Light Induced Degredation on the Sensitization Phenomenon in a-Si:H, I Balberg and Y. Dover, Invited paper, *Festschrift in Honor of Prof. R. Grigorovici*, J. of Optoelecrtonics and Advanced Materials, **8**, 1996-2002 (2006).

Electrical transport mechanisms in three dimensional ensembles of silicon quantum dots, I. Balberg, Applied Physics Reviews; Leading story of issue 6 (Setember 15) of: J. Appl. Phys. **110**, 061301; 1-26 (2011).

Invited papers in conferences

The Acoustoelectric Effect, A. Many and I. Balberg, Invited Paper, the Second Chania Conference, July 1968. Published in *Electronic Structure in Solids*, Haidemenakis, ed. pp. 385-415 (Plenum Press, NY, 1969).

Critical Resistance and magnetoresistance in magnetic Materials, I. Balberg, Invited Paper, Europhpysics Conference on *Itinerant-Electron Magnetism*, Oxford, England, September 1976, Published in Physica 91B, 71-81 (l977).

Critical Behavior of the Electronic Properties of Magnetic Semiconductors, I. Balberg, Invited Paper, International Conference on Magnetic Semiconductors, September 1979, Montpellier, France. Published in J. de Physique 41, C5-75 (l980).

Anisotropic Percolation in Systems of Stick-like Conducting Particles, I. Balberg. Invited Paper, Israel Phys. Soc. 1983 Annual Meeting, Ramat-Gan, April 1983. Published in Bull. Israel Phys. Soc. 29, 11 (l983).

Percolation, Clusters and Noise, I. Balberg. Invited Paper. Israel Phys. Soc. 1984 Annual Meeting, Jerusalem, April 1984. Published in Bull. Israel Phys. Soc. 30, 28 (l984).

Recent Developments in Continuum Percolation, I. Balberg, Invited Paper, The Second Bar-Ilan Int'l. Conference on the Physics of Disordered Systems, Ramat-Gan, January 1987. Phil. Mag. B 56, 991-1002, (1987).

Physical Processes in Percolating Systems, I. Balberg. Invited Paper presented at the 3rd University of California Conference on Statistical Mechanics. March l988. Published in Nuclear Physics B (Proc. Supp.) 5A, 186-191 (l988).

Percolation in the Continuum, I. Balberg. Invited Paper. Israel Phys. Soc. Annual Meeting, Haifa, March 1988. Published in Bull. Israel Phys. Soc. 34, 83 (l988).

Theory and Applications of the Photocarrier Grating Technique, I. Balberg, Invited Paper, Israel Phys. Soc. Annual Meeting, Ramat-Gan, April 1989 Published in Bull. Israel Phys. Soc. 35, 12-1, (1989).

The Photocarrier Grating and Its Applications in the Study of a-Si:H Materials and Devices, I. Balberg invited paper, Materials Research Society, Spring Meeting April 1992. Published in Mat. Res. Soc. Symp. Proc. 258, 693 (1992).

Carrier Transport and its Relation to Electroluminescence in Porous Silicon, I. Balberg, invited paper, Abstract Proceedings of the 2nd Conf. on Material Science and Technology (Agil, Tel Aviv, 1998) , p. 99.

Transport and Electroluminescence in Porous Silicon : The Pea Pod Model, I. Balberg, invited paper, Proc. of the 1st International Workshop on Semiconducting and Superconducting Materials, Turin, Italy, February 1999. Published in Phil. Mag. B 80, 691-703 (2000).

A Comprehesive Picture of the Electrical Transport phenomena in Carbon Black-Polymer Composites, I. Balberg, selected paper of the 3rd Int. Conf. on Carbon Black Mulhouse, October 2000, published in Carbon 40, 139-143 (2002).

Recent Issues in Thin film Solar Cells, I. Balberg, invited keynote lecture, in the 20th Annual Conference of the Israel Vacuum Society, June 2001. Published in the booklet of abstracts p. A-I.

Transport and Phototransport in Amorphous and Nanostructured Semiconductors, I. Balberg, invited plenary paper, in the 1st International Conference on Amorphous and Nanostructured Chalcogenides, Published in the Journal of Optoelecrtonics and Advanced Materials, 3, 587-600 (2001).

The Correlation Between Luminescence and Transport in Systems of Silicon Nanocrystallites, I. Balberg, invited planery paper in the 25th International Semiconductor Conference (CAS), Sinaia, October 2002, Published in the CAS-25 proc. (IMT, Bucharest, 2002), pp. 99-102

Mapping of the Density of States in Various Silicon Systems by Phototransport Spectroscopy, I. Balberg, invited plenary paper in the International conference on the Physics of Electronic Materials, Kaluga, October 2002, published in the Proc. of the 1st PHYEM conf. (KSPU, Kaluga, 2002), pp. 16-17.

A Simultaneous Experimental Determination of the Distribution and Character of the Two Band-tails in Disordered Semiconductors, I. Balberg, Invited paper, *Festschrift in Honor of S.R. Ovshinski*, J. of Optoelecrtonics and Advanced Materials, 4, 437-454 (2002).

The Special Electrical Properties and the Corresponding Applications of Carbon black-Polymer Composies, I. Balberg , *invited paper*, 10th Intl' Symposium on Continuum Models

and Discrete Systems, Shoresh 2003. Published in Nato Science Series:II: Mathematics, Physics and Chemistry: 158, part II, 47-53 (Kluwer Dordrecht, 2004).

The Mutual Exclusion of Luminescence and Transport in Nanocrystalline Silicon Networks, I. Balberg, E. Savir and J. Jedrzewski, invited paper , Int'l Conference on Science and Applications of Nanostructues, Hebrew University,Jerusalem, 2003.

Electrical Behavior of Si/SiO_2 Nanocomposite Films, V. Inacu, L. Jdira, M. Draghici, M.R. Mitroi, I. Balberg and M.L. Ciurea, Invited planery paper in the 26^{th} International Semiconductor Conference (CAS), Sinaia, October 2003, Published in the CAS-26 proc. (IMT, Bucharest, 2003), pp. 83-86.

Electrical Transport Phenomena in Systems of Semiconductor Quantum Dots, I. Balberg, invited paper, Nanomat 2006 (Antalya, June 2006), J. of Nanoscience and Nanotechnology, 8, 745-758 (2008).

Electrical Transport Mechanisms in Ensembles of Silicon Quantum Dots, I. Balberg, Invited paper, the 3^{rd} Intl' Conf. on Mico-Nanoeletronics and Nanotechnology, Athens Greece November 2007) Published in Phys. Stat. Sol. (a), 5, 3771-3775 (2008).

The electrical transport and luminescence mechanisms in ensemblels of Si nanocrystallites, I. Balberg, Invited plenary paper, Itnl' Symposium on Nanodevice Technology (2008 SNDT), Hsinchu, Taiwan, May 2008. Published in the 2008-SNDT booklet of abstracts (NDL, Hsinchu, 2008) p. K1.

The Tunneling Percolation Problem, I. Balberg, Invited plenary paper, the annual meeting of the Dielectrics Group of the UK Institute Of Physics (London, UK, April 2008), published in J. Phys. D, 42, 064003; 1-9 (2009).

The electrical transport and luminescence mechanisms in ensemblels of Si quantum dots, I. Balberg, Invited plenary paper, The advanced materials and nanotechnology (AMN4) Itnl' conference, Dunedin, New Zealand, February 2009. Published in AIP Conf. Proc. 1151, 5-8 (2009).

The tunneling percolation staircase. I. Balberg, Invited paper, Stat. Mec. Day IV, Weizman Institue, Rehovot, Israel, June 23 (2011).

The effects of Confinement and Coulomb Blockade on the transport in ensembles of Si Quantum Dots, I. Balberg, invited paper, the 222 conference of the Electrochemical Society, Honolulu, October 7-15 (2012), ECS transactions 50, 87-104 (2013).

Electrical transport in ensembles of semiconductor quantum dots, I. Balberg, invited paper, the International Materials Science Conference, Cancun, August 12-17 (2012), Physica E, 51, 2-9 (2013).

The evolvement of the transport mechanism with the ensemble density of Si quantum dots, I. Balberg, invited paper in the ICN2013 conf. London, Ontario, August 12-16, 2013. Published in Electronic, photonic, plasmonic and magnetic properties of nanomaterials, AIP Conf. Proc. 1590, 3-9 (2014).

Patent granted

Amorphous Silicon MOS Inductor, I. Balberg, U.S. Patent No. 4, 282, 537, issued August 4, 1981.

Major journal papers in the last five years

Solution of the tunneling-percolation problem in the nanocomposite regime, G. Ambrosetti, C. Grimaldi, I. Balberg, T. Maeder, A. Danani amd P. Ryser, Phys. Rev. B, **81**, 155434; 1-12 (2010).

The basic physics of phototransport as manifested in thin films of In-doped CdTe, I. Balberg, Y. Dover E. Savir and P. von Huth , Phys. Rev. B, **82**, 205302; 1-14 (2010).

Evidence of quantum confinement effects on interband optical transitions in Si nanocrystals, M. I. Alonso, I. C. Marcus, M. Garriga, A. R. Goni, J. Jedrzejewski and I. Balberg, Phys. Rev. B, **82**, 045302; 1-8 (2010).

Percolation-to-tunneling crossover in conductor-insulator composites, G. Ambrosetti, I. Balberg and C. Grimaldi, Phys. Rev. B, **82**, 134201; 1-7 (2010).

The electrical transport in three dimemsional ensembles of Si quantum dots, I. Balberg, E. Savir and J. Jedrzejewski, Phys. Rev. B, **83**, 035318; 1-14 (2011).

Comment on “Direct measurements of the percolation probability in Carbon Nanofiber-Polyimiide”, I. Balberg, O. Millo, D. Azulay, C. Grimaldi, G. Ambrosetti, Phys. Rev. Lett. Comment, **106**, 079701 (2011).

Local charging effects in nanocrystalline CdSe films, D. Toker, I. Balberg, O. Zelaya-Angel, E. Savir and O. Millo, Phys. Rev. B, **83**, 085303; 1-8 (2011).

Temperature dependence .of the local conductance in nanocrystalline CdSe, D. Toker, I. Balberg, O. Zelaya-Angel, E. Savir and O. Millo, Appl. Phys. Lett, **99**, 012102; 1-3 (2011).

Electrical transport mechanisms in three dimensional ensembles of silicon quantum dots, I. Balberg, J. Appl. Phys. **110**, 061301; 1-26 (2011)..

Microscopic evidence for the modification of the electronic structure at grain boundaries of $Cu(In_{1-x},Ga_x)Se_2$ films, D. Azulay, I. Balberg, and O. Millo, Phys. Rev. Lett.**108**, 076603; 1-5 (2012).

Enhanced formation of Ge nanocrystals in $Ge:SiO_2$ layers by swift heavy ions, I.V. Antonova, V.A. Skuratov, V.A. Volodin, S.A. Smagulova, D.M. Marin, A. Janse van Vuuren, J. Neethling, J. Jedrzejewski, I. Balberg, J. of Physics D-Applied Physics, **45**, 285302 1-6 (2012).

The importance of bendability in the percolation behavior of Carbon Nano Tube and Graphene-polymer composites, I. Balberg, J. Appl. Phys. **112**, 066104; 1-3 (2012).

Doping and quantum confinement effects in single Si nanocrystals observed by scanning tunneling spectroscopy, O. Wolf, M. Dasog, Z. Yang, I. Balberg, J.G.C. Veinot, and O. Millo, Nano Letters, **13**, 2616-2521 (2013).

Charge deep-level transient spectroscopy of SiO_2 and Al_2O_3 layers with embedded Ge nanocrystals, I.V. Antonova, V.I. Popov, S.A. Smagulova, J. Jedrzejewski, and I. Balberg, J. Appl. Phys. **123**, 084308; 1-7 (2013).

Phototransport spectroscopy of ensembles of Si quantum dots, O. Wolf, O. Millo and I. Balberg, J. Appl. Phys. **113**, 144314; 1-8 (2013).

The percolation staircase model and its manifestation in composite materials, I. Balberg, D. Azulay, Y. Goldstein, J. Jedrzejewski, G. Ravid and E. Savir, Euro. Phys. J. B, **86**, 428 (1-17) (2013). See also Europhysics News, Highlights **45** (1) 08 (2014).

Vladation of the tunneling percoataion staircase model in granular metals, I. Balberg, D. Azulay, J. Jedrzejewski and E. savir, Appl. Phys. Lett. **104**, 253109; 1-4 (2014).