Curriculum Vitae

Mihai N. Mihaila

Mihai N. Mihaila was born in December 27, 1948. He received M. Sc. and Ph. D. in physical electronics from the Department of Electronics, Politechnical University of Bucharest, Romania, in 1997 (supervised by acad. Mihai Draganescu). Between 1971 and 2003 he was with ICCE-Bucharest (since 1996, IMT-Bucharest), first as a trainee engineer, then as a principal research scientist. Between 2003 and 2015, he worked as a senior principal research scientist at the Advanced Technology Center, Honeywell-Romania. Since 2015, he is with IMT-Bucharest as a research fellow. For different periods, he was with ITT-Intermetall (Freiburg, Germany), Department of Electrical Engineering of the University of Minnesota (honorary fellow in the professor Aldert van der Ziel's noise laboratory), Department of Physics of the Politechnical University of Turin (Italy), Material Laboratory of the "Galileo Ferarris" Institute (Turin, Italy), Department of Solid-State Electronics of the University of Duisburg (Germany).

Over the years, he has been engaged in the low-frequency noise transistor design, technology and characterization (1971-1974), defect engineering and effect of lattice defects on the low frequency noise (1975-1983), physics of fluctuations and microscopic origin of low frequency noise in homo- and heterojunction bipolar transistor, high electron mobility transistor (2D electron gas), MOS transistor, continuous and discontinuous metal films, carbonic (nano)materials), silicon nanowires, (nano) materials for sensing and their characterization, new sensing mechanisms/principles and sensing structures (2003-2015), (nano) material characterization by phonon noise spectroscopy (1983-present); structures for solar energy conversion (2007-present), including Gratzel cells with both organic cromophores and quantum dots.

M. Mihaila is recognized for the discovery of the phonon excitation mechanisms in 1/f noise ("phonon participation in the 1/f noise was born out in a very interesting paper by Mihaila" (Kousic, van Vliet *et al*., Adv. in Phys. 34, 663,1986).) and the identification of the thermal vibration motion of the surface and bulk atoms as the fundamental microscopic source of 1/f noise in solids[1]. These results led him to the discovery of a new method of spectroscopy (1/f noise spectroscopy), which can be used to obtain the thermal vibration energies of atoms and

[1] a) M. Mihaila, „Phonon observations from 1/f noise measurements", ***Physics Letters*** 104A, 1984, pp. 157-158; b) M. Mihaila, "Phonon signatures in the 1/f noise of copper, silver and silicon", ***Physics Letters*** 107A, 1985, pp. 465-467; c) M. Mihaila, „Phonon fine structure in the 1/f noise of metal, semiconductors and semiconductor devices", in ***Noise in Oscillators and Algebraic Randomness***, Lecture Notes in Physics, edited by M. Planat, Springer Verlag, 2000, pp. 216-231; d) M. Mihaila, „Low-frequency noise in nanomaterials and nanostructures", in ***Noise and Fluctuations Control in Electronic Devices***, edited by A. Balandin, American Scientific Publishers, 2002, pp. 367–385; e) M. Mihaila *et al.*, "Electron-phonon coupling as the source of 1/f noise in carbon soot", ***Scientific Reports*** (2019) 9:947.

molecules, including those of a single molecule[2]. “Reflecting at the results of the Romanian electron devices school, I believe that this is the most important fundamental result of this school” (Mihai Draganescu, Timpul, anul X, nr. 9(422), 2-8 martie 1999). He patented, developed and applied this method to the characterization of nanomaterials, nanostructures and molecular recognition[2]. As a confirmation of these results, he recently reported “the first experimental result which quantitatively supports electron-phonon coupling as microscopic source of 1/f noise in a solid-state system.” Moreover, he found that 1/f noise extends into the thermal noise till phonon frequencies, which implies the breakdown of the equipartition law, therefore “a classic-quantum transition at a given frequency, above which Planck’s blackbody radiation law is valid.” (Scientific Reports, 2019). Consequently, 1/f noise is not a low-frequency effect, as considered for about a century.

He has over 125 papers published and communicated in the country and abroad (Solid State Electronics, Physics Letters, Fluctuations and Noise Letters, Electrochimica Acta, RCS Advances, Scientific Reports, etc.), 20 US patents (other 23 pending), 9 European patents and a series of patents in other countries (Japan, China, India, Romania), most of them in the domains of sensing and solar cells. He holds the "Dragomir Hurmuzescu" Prize of the Romanian Academy (1985) for "contributions to the study of 1/f noise in semiconductor devices". He is a “correspondent” member of the Romanian Academy.

[2] M. Mihaila, „System of phonon spectroscopy“, ***US 7612551 B2 patent***, Nov. 3, 2009.