Alex Mezheritsky

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Experience

PiezoTechnologies / Amphenol, Indianapolis, IN

Sep. 2018 to present, Senior Transducer Engineer.

Responsible for developing ultrasonic transducers in oil and gas, and medical projects for Halliburton, Baker Hughes, BD, etc.

Daniel Measurement & Control **(*Emerson** Automation Solutions, Houston, TX*)

Jan. 2011 – Sep. 2018, Senior Transducer Engineer

- R&D, simulation, design and testing ultrasonic transducers for gas and liquid flow meters.
- Key project principal engineer in NPD of fully metal monolithic (3D-printed) transducer for a new generation of custody transfer gas ultrasonic flow meter with operation under -196ºC to +150ºC and pressures 0…4 kpsig.
- Planning, directing and coordinating development of acoustical transducers, manufacturing transition and support.

PiezoTechnologies, Indianapolis, IN

Oct. 2007 to Jan. 2011, Senior Transducer Design Engineer.

- Designed (*SolidWorks*), developed, tested, documented with FMEA for production at least 17 different types of custom designed ultrasonic systems and transducers with frequencies 1kHz- 20MHz, extreme working temperatures up to 350ºC and pressures up to 25 kpsi, with major renowned companies in:
  - Oil and Natural Gas industries for down-hole tool calibration (ultrasonic calipers), mud velocity measurement (time of flight / phase shift), formation analysis, ultrasonic mud-oil mixer;
  - Non-Destructive Evaluation (NDE) industry for fluid flaw detection, rock and wood characterization;
  - Medical industry: High Intensity Focused Ultrasound (HIFU), for cancer imaging and ablation;
  - Atomic industry for ultrasonic under liquid sodium viewing, and gas components separation;
  - US Military: air ultrasonic identification system.
- Project group leader, supervisor of engineering technicians.
- Piezomaterial characterization: tested, evaluated, designed, issued the PiezoMaterial Properties/Specification Table for all PiezoTechnologies' production piezoceramic compositions.
- Simulated and modeled with *COMSOL* the structural, acoustical and thermal transducer performance.

COMSOL, Finland Division / USA

Aug. 2007 to Oct. 2007, Consultant

- Consulted *COMSOL* in development of next simulation version for the Acoustics and MEMS modules.

Dong IL Technologies, Ltd. & Tronix Co., Seoul, S.Korea / USA

Dec. 1997 to June 2003, Specialist-Consultant

- Designed ultrasonic piezoceramic devices: resonators and filters, shock and knock sensors, multilayer piezoelectric transformers, ultrasonic cleaning transducers, print-heads.
- Consulted in organization of piezoceramic production in Dong IL Technologies (S.Korea).
- Determined and proposed piezoceramic chemical compositions for the transducers basic applications.

Phonon Corp. - Elpa Co., Moscow, Russia

Sept. 1979 to July 1997, Manager of research-production laboratory,
Leading Scientific Researcher, Senior Engineer, Engineer

- Designed, created and tested electro-acoustical piezoelectric devices: ultrasonic delay lines, 10kHz-30MHz resonators and filters, sensitive and powerful ultrasonic transducers, ultrasonic NDE tester, accelerometers, hydrophones, sonar and arrays for coast guard system (DOD) , piezotransducers and modulators for deflectors and fiber gyroscope, ultrasonic air transducers, piezoelements for igniters, fluid atomizer, piezotransformers.
- Created manufacturing technologies for volume production with optimization of piezoceramic materials, elements, devices and technological procedures to provide process efficiency and product quality.

- Programmed calculation of the piezotransducer structure and properties for modeling and simulation.
- Determined and researched complete set of PZT piezoceramic complex material constants, domain structure; quality factors and temperature stability under different physical conditions.
- Analyzed results of experiments, scheduled and managed the activity of a group.
- Created Russian Standards for piezoceramic materials and test methods.
- Responsible for management and coordination of research, design and production lab plan and budget, coordinated and supervised the staff activity, lab equipment maintenance and operation.

Russian Center for Patent Examination

Dec. 1984 to Feb. 1987, Patent Expert and Lecturer

· Examined requests for inventions and patents in the field of Electronics, Ultrasonic Techniques.

S.R. Institute of Applied Physics, Moscow, Russia

Oct. 1977 to May 1979, Engineer

· Designed, created and investigated semiconductor narrow gap 10μ infrared detectors for imaging.

Education

1992 Assistant professor Diploma (Russia) in Radio-Electronics.

1981-1985 **Moscow Institute of Physics and Technology (MIPT),** Moscow, Russia
Ph.D. Post-graduate course. Major: Physics of Dielectrics and Semiconductors / AcoustoElectronics.
Thesis: Theoretical and experimental investigation of the complex electro-elastic constants of piezoceramics.

1973-1979 **Moscow Institute of Physics and Technology (MIPT),** Moscow, Russia
M.S. Department of Physical and Quantum Electronics.
B.S. Major: Engineering Science (Automation, Electronics).
Thesis project included the research, design and development of 10μ infrared narrow gap semiconductor detectors for imaging.

Computer skills: design/simulation software - *SolidWorks*, *NX*, *ANSYS*, *COMSOL*, *PZFlex*, *PiezoCAD*; *MatLab*, *MathCAD*, *LabView*; programming languages - *C++*, *Fortran*, *Basic*; systems - *MS Office 365* - *Word*, *Excel*, *PowerPoint*; E-business - *Oracle* / *ENovia*.

Languages: English, Russian, Ukrainian

Activities: *IEEE* Member since 1998, *UFFC* (Ultrasonics) Society. Reviewer for the *IEEE UFFC.* Lean Manufacturing training; TRIZ problem solving experienced.

Publications: more than 70 scientific articles including 12 patents.
Invented, designed and improved a number of devices and manufacturing methods.
Planned and supervised (project leader) more than 10 R&D projects and participated in 20 technical projects at *PiezoTech* and *Daniel/Emerson* for the last 12 years.

INS Status US Citizen since 2003

Selected most recent publications:

1. "Advances in High Intensity Ultrasound," *Proc. 2019 Intern. Workshop on Acoustic Transduction Materials and Devices*, PannState University, State College, PA, 2019.
2. "Ultrasonic Transducer with a Sealed 3D-Printed Mini-Horn Array," *US patent Appl. no.* 16/149,068, Oct.2018.
3. "Q-Factor Spectrum of a Piezoceramic Resonator and Method for Piezoelectric Loss Factor Determination," *IEEE Trans. Ultrason, Ferroel., Freq. Control*, v. 64, no. 12, pp. 1849 – 1856, 2017.
4. "Transducer Mini-horn Array for Ultrasonic Flow Meter," *US patent no. 9 506 790*, 2016.
5. "Transducer for Ultrasonic Flow Meter," *US patent no. 9 295 923*, 2016.
6. "Ultrasonic Identification Device," *US patent 2012/0182833*, 2012.
7. "Quality Factor Concept in Piezoceramic Transformer Performance Description,"

IEEE Trans. Ultrason, Ferroel., Freq. Control, v. 53, no. 2, pp. 429 – 442, 2006.
8. "Elastic, Dielectric, and Piezoelectric Losses in Piezoceramics – How It works All Together," *IEEE Trans. Ultrason, Ferroel., Freq. Control*, v. 51, no. 6, pp. 695 – 707, 2004.
9. "Energy-Trapped" Material Parameter Optimization for a TE-Mode Piezoceramic Resonator," *Proc. 2003 IEEE International Frequency Control Symposium,* Florida, 2003.
10. "Invariants of Electromechanical Coupling Coefficients in Piezoceramics" *IEEE Trans. Ultrason, Ferroel., Freq. Control*, v. 50, no. 12, pp. 1742 – 1751, 2003.
11. "Efficiency of Excitation of Piezoceramic Transducers at Antiresonance Frequency," *IEEE Trans. Ultrason, Ferroel., Freq. Control*, v. 49, no. 4, pp. 484 – 494, 2002.
12. "Quality Factor of Piezoceramics," *Ferroelectrics,* v. 266, pp. 277 – 304, 2002.

(References upon request)