

About V. I. Vernadsky IGIC NASU

The V.I. Vernadsky Institute of General and Inorganic Chemistry was founded in 1918 by Academician V.I. Vernadsky. It was originally a Chemical Laboratory in Kyiv and later joined with the research department of chemistry at the Kyiv Polytechnic Institute. In 1929, it became the Research Institute of Chemistry and in 1931, it joined the Ukrainian SSR Academy of Sciences as the Institute of Chemistry. It was renamed the Institute of General and Inorganic Chemistry in 1945 and received its current name in 1993.



The Institute has founded five chemical institutions and is now a state nonprofit institution and the main scientific center for fundamental and applied research in various fields of chemistry. It actively cooperates with domestic and foreign universities, academic institutions, research centers, and industrial associations.

Today, the main practical purpose of the scientific activity of V.I. Vernadsky IGIC of the NAS of Ukraine is the creation of highly efficient, environmentally friendly, energy- and resource-saving technologies, including the inclusion of the secondary raw material in the production process, which will contribute to reducing the man-caused environmental impact.

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the synthesis of new microwave materials with permittivity from 10 to 150 and varied dielectric quality factor Q which are needed to create resonator rectenna for energy harvesting and electromagnetic sensing, study their dielectric properties, and develops ways to control the dielectric properties in order to best match the design requirements for the created metamaterials.

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Belous Anatolii

Academician of NAS of Ukraine, Professor
Doctor of Chemical Sciences, PPCD

Project Tasks:

1. Coordination of joint research with FTMC and IGIC
2. analysis of obtained results related to the experiments;
3. discussion of the results obtained by other partners involved into the project and participation in preparation of joint articles and other outputs.
4. Participation in joint meetings of researches involved into the project.



Oleg V'yunov,

Senior scientist,
Ph.D, senior researcher

Project tasks:

1. X-ray characterization of the crystal structure by Rietveld full profile analysis;
2. study of the phase formation and its effect on structural peculiarities of the ceramics.



Oleksandr Fedorchuk,

Ph.D, researcher

Project tasks:

1. Characterization of the dielectric parameters of studied materials, preparation of joint papers and patents.



Tetiana Plutenko,

Ph.D, researcher

Project tasks:

1. Synthesis and sintering of materials;
2. preparation of joint papers and patents.



Pavlo Torchyniuk,

Ph.D, researcher

Project tasks:

1. Synthesis and sintering of materials;
2. preparation of joint papers and patents.

V. I. Vernadsky IGIC NASU deliverables:

- microwave dielectrics with $Q_{10\text{GHz}} \sim 5000-7000$ based on multiphase systems with the volumetric thermal compensation effect.
- microwave dielectrics based on a mixture of perovskite and spinel phases with $Q_{10\text{GHz}} \sim 10000$
- Optimization of parameters of microwave dielectric resonators prototypes.

V. I. Vernadsky IGIC NASU (additional specialists who will actively participate in the project execution)



Solopan Serhii,
Senior researcher,
Dr.Sc., senior
researcher



**Kovalenko
Leonid,**
Ph.D, senior
researcher

Some equipment for synthesis of MW dielectric materials



Drums and layers for planetary mill PM-100

Analytical scales for weighing the initial reagents and equipment for synthesis.



Equipment for deposition of thin films and electrodes.
(a) VUP-5; (b) SC7620 and CA7625.



**Tube furnace for rapid heating
GSL-1500X-RTP50**



**High-temperature furnace
KSL-1500X**

Some equipment for mechanical preparation of MW dielectric materials



Sanding and polishing machine with automatic pneumatic head Forcimat & Forcimol 1V



Equipment for diamond cutting

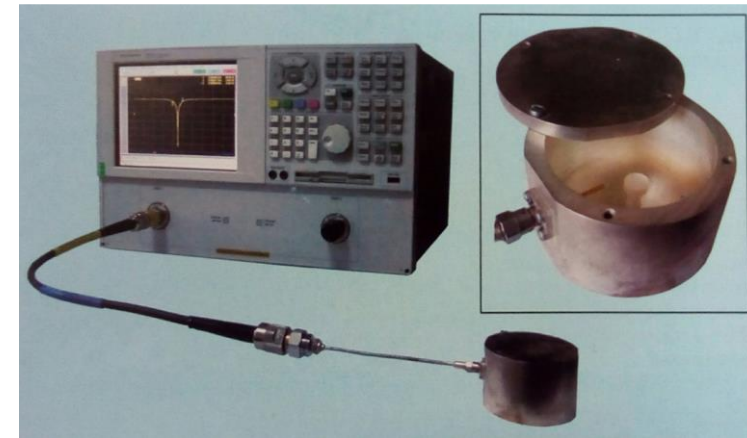
Some equipment for investigation of MW dielectric materials



Electron microscope
SNE-4500M



Experimental setup
for impedance
analysis.



Setup for analysis of MW dielectrics
Agilent N5230A.