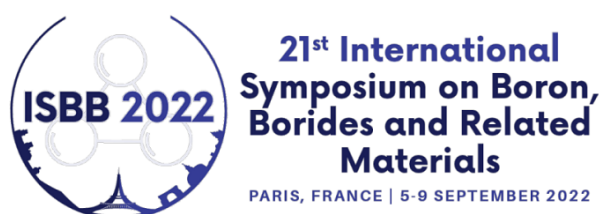


**IN MEMORIAM: PROF. GIORGI TAVADZE  
(1945, JANUARY 1st – 2021, JANUARY 7th)**

This is a publication of the author's presentation at the 21st International Symposium on Boron, Borides and related Materials, 2022 September 5 – 9, Paris, France (ISBB 2022) made to tribute to Prof. Giorgi Tavadze in response to the kind invitation of Dr. Nathalie Vast, the ISBB 2022 Chair. It is much appreciated Dr. Nathalie Vast's letter sent on behalf of the ISBBs' International Scientific Committee to the Ferdinand Tavadze Metallurgy and Materials Science Institute headed by Prof. Giorgi Tavadze:

“Dear Colleagues, the Members of the International Scientific Committee of the International Symposium on Boron, Borides and related Materials (ISBB) have learnt with an immense sadness the decease of Prof. Giorgi Tavadze. Prof. Giorgi Tavadze headed the Institute – Ferdinand Tavadze Metallurgy and Materials Science Institute – which coordinated boron research in the former Soviet Union. Research performed at the Laboratory of Boron, Its Alloys and Compounds has brought and is bringing important contributions to the understanding of the physics and chemistry of boron compounds, and to the development of their applications. Prof. Giorgi Tavadze and his Colleagues have continuously been key-contributors to the ISBB conferences. Moreover, the Tavadze Institute has twice (in 1972 and 1984) been held ISBBs in Tbilisi, Georgia, and some of us have precious memories of these meetings. Prof. Giorgi Tavadze intended to attend the ISBB 2021 in Paris, postponed because of the COVID pandemic. We will miss our talented Colleague, and wish to send our sympathy and condolence to you, his Colleagues, as well as to Professor Tavadze's Spouse and Family. Warm regards, Nathalie Vast.”



**In memoriam: Prof. Giorgi Tavadze  
(1945, January 1st – 2021, January 7th)**

**Levan Chkhartishvili<sup>1,2</sup>**

<sup>1</sup> Georgian Technical University

<sup>2</sup> Ferdinand Tavadze Metallurgy and Materials Science Institute

Tbilisi, Georgia, [levanchkhartishvili@gtu.ge](mailto:levanchkhartishvili@gtu.ge)

1

## Biography at-a-glance

Giorgi (George) or Gogi Tavadze 1945 – 2021

### Ferdinand Tavadze Metallurgy and Materials Science Institute

- Started as Junior Laboratory Assistant 1967  
and went through all stages to Director 2006 – 2021
- Doctor of Technical Sciences 1995
- State Prize of Georgia in Science and Techniques 1998
- Professor of Georgian Technical University 2005
- Giorgi Nikoladze Prize of NAS of Georgia 2013
- Member of Georgian National Academy of Sciences 2014
- Vernadski's Gold Medal of NAS of Ukraine 2017

## 2

### Armed Forces of Georgia

- Officer (retired as Colonel) of Armed Forces of Georgia 1992 – 2004
- Vakhtang Gorgasali Order 1996
- National Coordinator of NATO Army Armament Group (AAG)  
and Research and Technology Organization (RTO) in Georgia 1997 – 2005



“The Magnificent Seven” of Georgian metallurgists – 1970. Giorgi Tavadze is third from right.



“Thirty Years Later”: “The Magnificent Seven” of Georgian metallurgists – 2000. Giorgi Tavadze is absent: he is “In the Army Now”.

## 3



Academician **Giorgi Tavadze** in 2010s.

2020 was the 75th anniversary of the founding of Ferdinand Tavadze Metallurgy and Materials Science Institute.

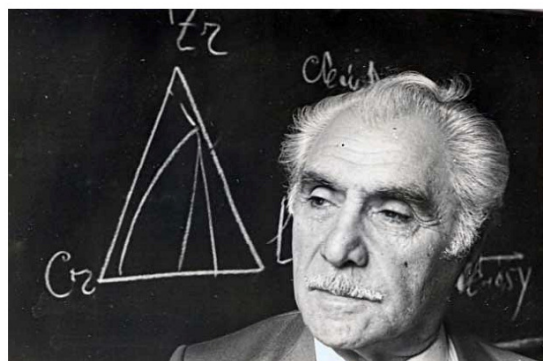
To celebrate it, Academician Giorgi Tavadze, Director of the Institute, initiated the 4th International conference "Inorganic Materials Science Modern Technologies and Methods".

Unfortunately, the COVID 19 pandemic fundamentally changed the Institute's plans: on January 7, 2021, Giorgi Tavadze deceased of it.

4

## Father

The history of the Metallurgy and Materials Science Institute (MMI) covers two quiet different periods – Soviet and post-Soviet. In the Soviet Union, the Institute was the leading organization in several key scientific and technical directions, including, **boron studies**.



Academician **Ferdinand Tavadze** was the Director of the institute at that time. He had been working for the development of the institute for 38 years (1951 – 1989) and that is why Ferdinand Tavadze did deserve that the Institute was named after him since 1990.

5



Ferdinand Tavadze and President of Academy of Sciences of USSR **Anatolij Aleksandrov** in 1986.

MMI delegation led by Ferdinand Tavadze at Physico-Technological Institute of Metals and Alloys of Ukraine Academy of Sciences in **1980**.



**6**

Continuation of scientist-metallurgist profession was Ferdinand Tavadze's hobby – the restoration of the **history of Georgian metallurgy**. See some specimens of archaeological discovers in Georgia examined at the Institute.



Colchis axes  
**16th – 15th cc BC**



Bronze dagger  
**15th – 14th cc BC**



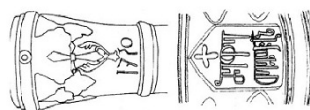
Bronze hoes  
**13th – 12th cc BC**



Trialeti, Georgia, silver bowl with ritual sketches, **15th c BC**. Molding technology for receiving such hollow-body manufactures was restored by Ferdinand Tavadze's investigations.



Georgian warrior armory  
**10th – 12nd cc**



Symbolism of Georgian cannons in **1720**



Georgian money cut in mint in **1820**

**7**





Ferdinand Tavadze with Institute colleagues at Sioni's country house.



Participants of the 1960 rally Tbilisi – Mamisoni Pass in Greater Caucasus – Odessa and back: A. Mikeladze, L. Sakvarelidze and G. Tsagareishvili.



Analysis of lost match by Institute football team "coach" Ferdinand Tavadze (1960).

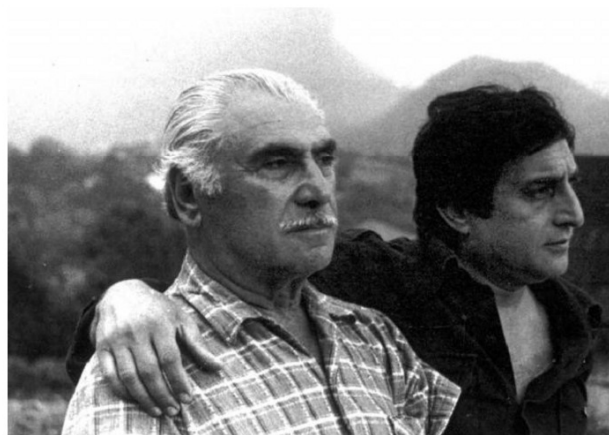


Ferdinand Tavadze with children: **Gogi Tavadze** in the center.

8

Under the leadership of Ferdinand Tavadze the Institute successfully held two ISBBs:

- 4th ISBB 1972, Tbilisi, Georgia
- 8th ISBB 1984, Tbilisi, Georgia



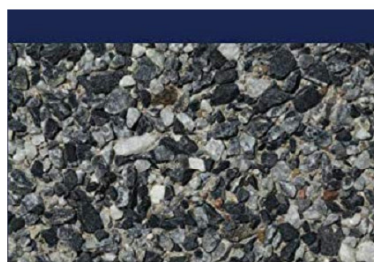
Father and son look to the future with hope.

9

## Giorgi Tavadze's scientific works

Giorgi Tavadze (co)authored:

- More than 200 scientific journal articles
- More than 40 invention patents
- 2 monographs



George Oniashvili  
G. Tavadze  
G. Zhakharov, Z. Aslamazashvili  
**Self-propagating High-temperature Synthesis of Ferrous Alloys**

- G. Oniashvili, G. Tavadze, G. Zhakharov, Z. Aslamazashvili. **Self-propagating High-temperature Synthesis of Ferrous Alloys**, Riga, Lambert Acad. Publ., 2018, 88 pp.



10



- G. F. Tavadze, A. S. Shteinberg. **Production of Advanced Materials by Methods of Self-Propagating High-Temperature Synthesis**, 2013, Berlin – Heidelberg, Springer, xix & 156 pp.

This monograph initially was published in Russian in **2011** and then translated into English in **2013** and Chinese in **2016**.

11

### Research directions of the MMI

- State standards for production classification of manganese ores
- Closed ores melting furnace
- Steels and alloys (special steels and cast irons, corrosion, foundry, steel ladle refining, archaeological metal exploration, etc.)
- **Boron, its alloys, compounds and composites**
- Semiconductor materials metallurgy
- Metals pressure processing and continuous casting
- Physical chemistry of metallurgical processes
- Self-propagating high-temperature synthesis (SHS)
- Inorganic materials science
- Corrosion Research
- Metal-ceramic compositions
- Metal structures fatigue
- Wear resistant materials
- Semiconductor materials science
- Pyrometallurgy
- Waste utilization and recycling

Giorgi Tavadze participated in most of them.

## 12

Below, we list only boron-related studies:

- Boron  $^{10}\text{B}$  isotope doped special steels for nuclear reactor parts and radiation-resistant containers
- Fine-crystalline thin films or boron and its compounds with transition metals (Fe, Co, Ni, Ti, Zr, V, Hf) obtained by superfast cooling ( $\approx 10^6$  g/s) of boride melts. **Quasi-eutectic** is the term introduced by Giorgi Tavadze.
- SHS synthesizing high-temperature boron-containing ceramic materials such as boron carbide  $\text{B}_4\text{C}$  and boron nitride BN
- SHS ballistic shield composition “Tori”  $\text{B}_4\text{C-TiB}_2\text{-Al}_2\text{O}_3$  with superior characteristics related to its ultra-dispersive structure



(a)



(b)



(a)



(b)

Ceramic armor plates (a) and armor block made on their base (b). Armored helmet (a) and bulletproof vest (b)

## 13



## Self-propagating high-temperature synthesis (SHS) meetings



Participants of International Conference on SHS in Gelati, Georgia, in **1984**.



Participants of Meeting on SHS problems in Tbilisi, Georgia, in **2005**.



At 9th International Symposium on SHS, Dijon, France, **2007**.

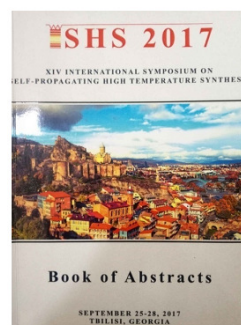


At 10th International Symposium on SHS, Tsakhkadzor, Armenia, **2009**.

14



Opening session of 14th International Symposium on SHS in Georgian National Academy of Sciences in **2017**.



Cover of Book of Abstracts of SHS 2017, Tbilisi, Georgia.



SHS 2017 participants in Mtskheta, the old capital of Georgia.

15

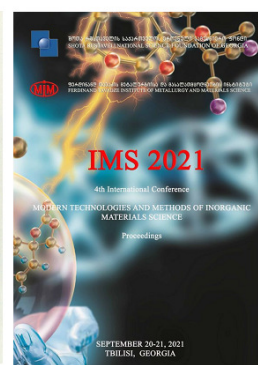
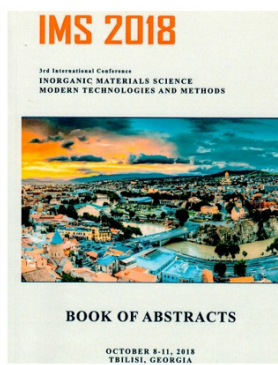


## International Conferences “Inorganic Materials Science Modern Technologies and Methods”



Giorgi Tavadze opens the **IMS 2018**.

IMM held IMSs four times: in 2012, 2015, 2018 and 2021.



16

## International collaborations



Georgian Delegation in Turkmenistan in 2011. President of Georgian NAS **Giorgi Kvesitadze** is first from right.



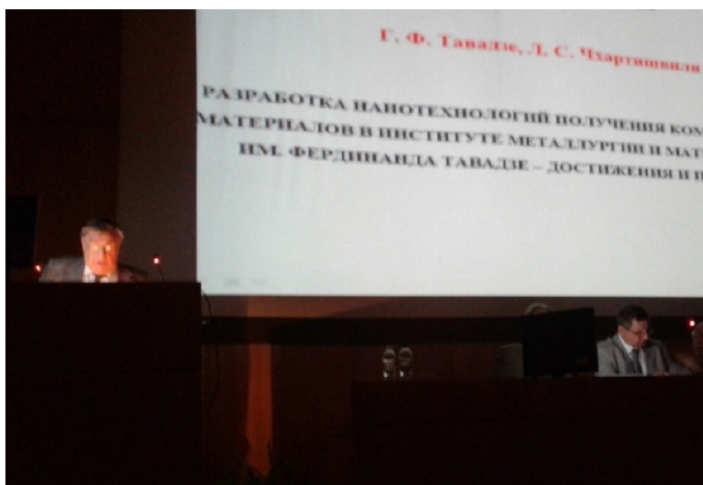
Prof. Hani Henein, Director of Advanced Materials and Processing Laboratory (Alberta University, Canada) visiting MMI in **2012**.



Visiting President of Ukraine National Academy of Sciences **Boris E. Paton** in 2011.

In **2017**, by the resolution of Presidium of National Academy of Sciences of Ukraine for significant success achieved in the field of powder metallurgy the Director of F. Tavadze MMI, Acad. Giorgi Tavadze is awarded with the highest prize of NASU – **Vernadski’s Gold Medal**.

17



21st Session of Scientific Council on New Materials at Committee of Natural Sciences of International Association of Academies of Sciences “Composite Functional Materials”

2016, Ukraine, Kyiv

National Academy of Sciences of Ukraine

E. O. Paton Electric Welding Institute

- G. F. Tavadze, L. S. Chkhartishvili. Development of nanotechnologies of production of composite materials in the Ferdinand Tavadze Institute of Metallurgy and Materials Science – Achievements and prospects.

18



At Conference “Up-to-Date Problems of the Physics of Metals and Metallic Systems” dedicated to 70th anniversary of the G. V. Kurdyumov Institute for Metal Physics (IMP), **Acad. Giorgi Tavadze** presents a gift to **Acad. Orest Ivasishin**, Director of the IMP.



After friendly dinner at “Verkhovina” restaurant: Giorgi Tavadze and Orest Ivasishin are first and fourth from the left, respectively.



Gift: Panther, bronze mini-sculpture, 7th – 5th cc. BC, Samtavro, Georgia, a copy.

19



## Reorganization of the Institute

The turbulent period of the 1990s was a severe test for Georgian science, in general. Of course, economic depression affected universities and research institutions as well, including Ferdinand Tavadze Metallurgy and Materials Science Institute.

Giorgi Tavadze became Director during a period of stagnation, when the institute was close to collapse. However, his scientific professionalism, vision of perspective and firmness of character made it possible to overcome almost all the obstacles.

Initially, the Institute functioned in the system of the Georgian National Academy of Sciences. Then it was transferred to the Ministry of Science and Education of Georgia. And finally, in 2011 IMM was transformed into a LEPL and included in the State Military Scientific-Technical Center “Delta” of the Ministry of Defense of Georgia. These organizational changes affected the directions of scientific research carried out by the Institute, as well as its technical and financial support.

In 2018, under the leadership of Giorgi Tavadze, a new complex of the Ferdinand Tavadze Metallurgy and Materials Science Institute has been built. It in addition of Laboratory Campus comprises Metallurgical (ore-smelting, molding, rolling and electrometallurgy workshops) and Materials Science (SHS of new materials) Production Sites.

20



Laboratory campus.



Metallurgical site.



Materials site.

21





### **Acknowledgements**

Many thanks to Dr. Jumber Khantadze and Mr. Joni Alania for providing the materials.

***Thank you for attention!***

**22**

***Levan Chkhartishvili***

Dr. Sci. Phys.-Math., Professor  
Engineering Physics Department  
Georgian Technical University  
Tbilisi, Georgia  
[levanchkhartishvili@gtu.ge](mailto:levanchkhartishvili@gtu.ge)

October 1, 2022