

1. **Complex research center on technical interest materials at low temperatures**
2. **Research center on solid state physics and nanomaterials**

**Director:** Prof.dr. R.TETEAN

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**Research team:**

Prof.dr. Emil Burzo,  
 Prof.dr. Marin Coldea,  
 Prof.dr. Mircea Crisan  
 Prof.dr.Aurel Pop  
 Prof.dr. Viorel Pop  
 Prof.dr. Ioan Grosu  
 Assoc.prof.dr. Daniel Andreica,  
 Assoc.prof.dr. Iosif G.Deac,  
 Assoc.prof.dr Raluca Ciceo Lucacel,  
 Lect.dr.Claudiu Lung,  
 Lect.dr.Mican Sever  
 Lect.dr.Gabriela Stiufuc,  
 Lect.dr. Roxana Păcurariu  
 Diana Benea PhD,  
 Albert Takacs PhD,  
 Balasz Istvan PhD, researcher

**Laboratories:**

Type	Location
Material synthesis laboratory	<b>Babes-Bolyai University, Faculty of Physics,</b> Kogalniceanu 1 str. 400084 Cluj Napoca, Romania
Thin films synthesis laboratory	
XRD laboratory	
Magnetic measurements in high fields laboratory	
Magnetic measurements in low fields laboratory	
Transport measurements in high magnetic field laboratory	
Thin films synthesis and transport measurements laboratory	
Glasses and Ceramic Synthesis Laboratory	
Electric and Magnetic Properties of Oxide Materials Laboratory	

**Research fields:**

*Solid state physics. Advanced materials. Applications.*

**Research topics:****1. Structural, electronic, magnetic and transport properties of advanced materials (bulk and thin films)**

- *rare earth-3d transition metals intermetallic compounds*
- *permanent magnets,*
- *soft magnetic materials*
- *oxide materials*
- *nanostructured materials*
- *superconducting materials*
- *structural and thermic studies on oxide glasses and ceramics*
- *electric and magnetic properties of bismuthate and borate glasses with high content of transitional metals*
- *applications like magnets, sensors, magnetic refrigeration, anticorrosion*
- *graphene*

**Equipments:**

1. 12 T VSM form Cryogenics: magnetic fields 0-12 T, temp. range 1.4-700 K. DC and AC magnetic measurements
2. MAGLAB 2000 from “Oxford Instrument”
  - temperatures range 1.5- 300 K and external fields up to 9 T
  - ac and dc magnetic measurements in the frequency range 10 Hz-10 kHz,  $2\text{ K} < T < 400\text{ K}$
3. 7 T transport measurement system form Cryogenics: magnetic fields 0-17 T, temp. range 1.7-300 K
4. Faraday type balance for the study of the magnetic properties in the fields up to 1T and temperature range of 77- 1200 K.
5. BRUKER D8 X ADVANCE X-ray diffraction equipment for the study of crystalline structure of polycrystalline materials in the temperature range of 77- 1000 K. The estimation of the structure, texture, internal stress and particles distribution for crystals in the temperature range of 77-1000K
6. Equipments for the nitrogen liquefaction.
7. Equipment's for samples preparation (arc melting, induction furnace, melting ovens, high energy ball milling, thermal treatment).

8. Oxide Thin film deposition equipment by DC and RF magnetron sputtering. Technical parameters: 3 magnetrons, pressure of sputtering gas (argon and oxygen) between  $10^{-3}$ - $10^{-5}$  Torr, control system for partial pressure, control of substrate temperature in the range 300 K – 1300 K, system for in situ thin films measurements.
9. Magnetic thin film deposition equipment by DC magnetron sputtering.
10. Programmable heater by controllable atmosphere for thermal treatments.
11. High temperature furnace (maximum temperature 1873 K)
12. 1200°C Furnace
13. 1200°C Vacuum Furnace
14. Cooling system for electrical resistivity measurement in the temp. range 7-300K.
15. Metallographical microscope and optical microscope.
16. Glove box with controlled atmosphere
17. Computers network

#### **Partners**

- University Joseph Fourier Grenoble,
- Institut L.Neel Grenoble
- University Paris XII,
- University of Rouen,
- University of Nantes
- University of Osnabruck,
- Chemnitz University of Technology,
- Free University of Brussel,
- Paul Scherer Institut Festkoerperforschung mit Neutronen und Myonen (NUM) (Switzerland),
- Physics Institut of Moldavian Academy,
- University of Athens,
- IEEL-Forth Heraklion
- University Gratz,
- Universidad Zaragoza.
- Universitatea Tehnică Cluj Napoca
- Universitatea de Medicină și Farmacie Cluj Napoca
- INCDTIM Cluj Napoca
- INCDFM Bucuresti

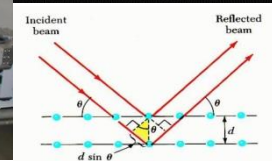
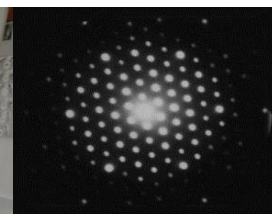
#### **Collaboration with researchers from:**

- Japan Atomic Energy Agency, Advanced Science Res. Center, JAPAN
- Russian Academy of Sciences, Siberia, Inst. of Metal Physics, RUSSIA

- Toyota Central r&D Labs., Inc. JAPAN
- Univ. of Oxford, Physics Dept., Oxford, UK
- Univ. Amsterdam, Van der Waals-Zeeman Inst., Faculty of Science, Amsterdam, The Netherlands
- Univ. Zuerich, Inst. fuer Physik, Zurich, SWITZERLAND
- Max-Planck-Institut, MPI fuer Chemische Physik fester Stoffe, Dresden, GERMANY
- RIKEN, Rutherford-Appleton Laboratory, Oxfordshire, UK
- Commissariat a l'Energie Atomique CEA, Lab. Leon Brillouin, Gif-sur-Yvette, FRANCE
- CNRS, Grenoble, Inst. NEEL, Dep. Matiere Condensee, Materiau et Fonctions, FRANCE



**Low temperature measurements**



**X-ray diffraction**



Cooling system for electrical resistivity measurement function of temperature



Sputtering system for film synthesis in DC and RF modes.



12 T VSM