

PREPARATION, INCORPORATION AND APPLICATION OF RADIOACTIVE WASTE IN GLASSES BASED ON B₂O₃-PbO

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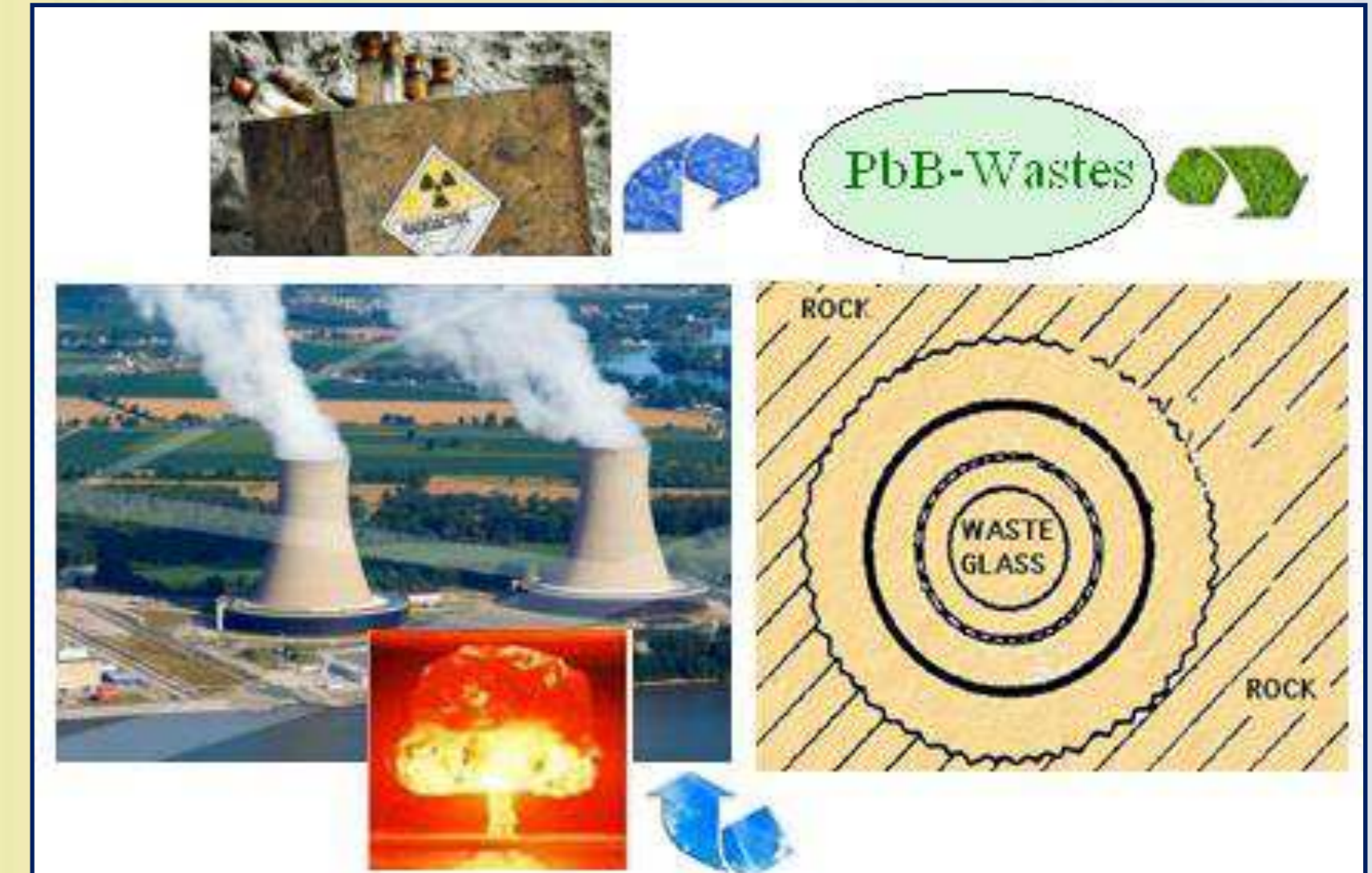
SIMONA RADA^{1,2}, ADRIANA DEHELEAN¹

¹National Institute for Research and Development of Isotopic and Molecular Technologies, Cluj-Napoca, Romania

²Technical University of Cluj-Napoca, Department of Physics&Chemistry, Romania

ABSTRACT

The invention relates to preparation, incorporation and application of new glasses based B₂O₃-PbO host glass (*PbB-Wastes* products) as an alternative for immobilization radioactive waste and development of new optical materials. The experimental model propose for testing the photoluminescent properties manifest a good efficiency, selectivity depending on the nature of the component ions and an increased reproducibility. The proposed procedure allows: i) immobilization of a high level of radioactive waste in the glasses; ii) immobilization of the volatile components of the radioactive segment; iii) applications of the *PbB-Wastes* products for optoelectronic devices.



AIMS

- Obtaining of new glasses based B₂O₃-PbO host glass as an alternative for the immobilization of radioactive waste;
- Development of new products suitable for optoelectronic applications

ADVANTAGES

- Simple preparation method, less expensive and products for applications in the field of luminescent materials;
- Method for capturing of volatile contaminants;
- A theoretical model for immobilization of radioactive waste in glasses;
- Developed materials by immobilization simulated radioactive waste (using as “surrogate” of actinide the rare earth ions), by modifying the composition of rare earth ions have clearly superior luminescent performance for technological applications

EXPERIMENTAL PROCEDURE

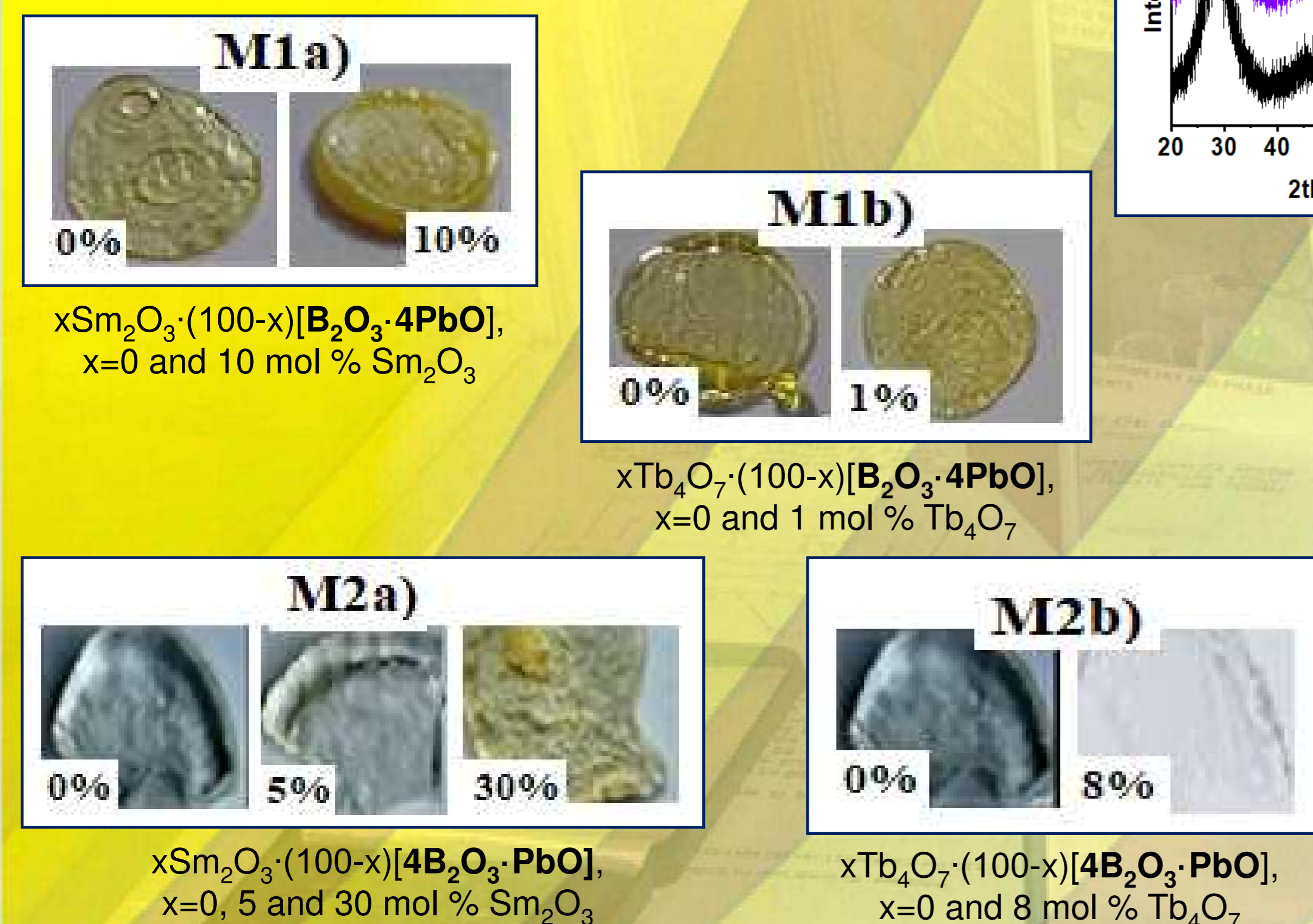
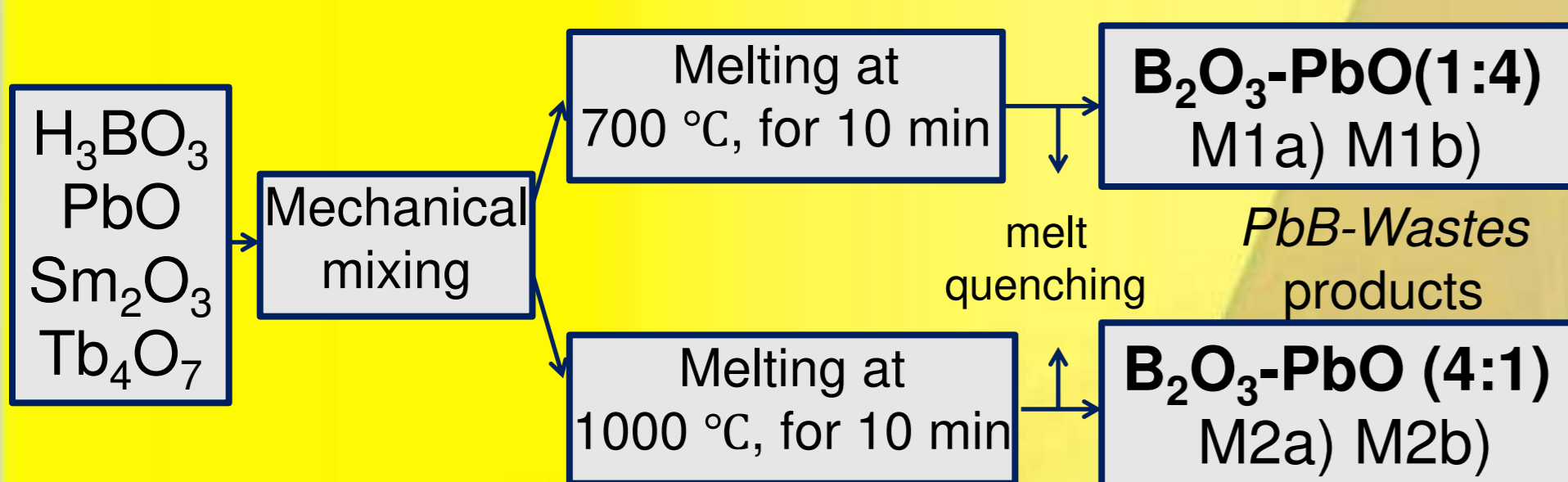


Fig. 1. Images of obtained *PbB-Wastes* products

RESULTS

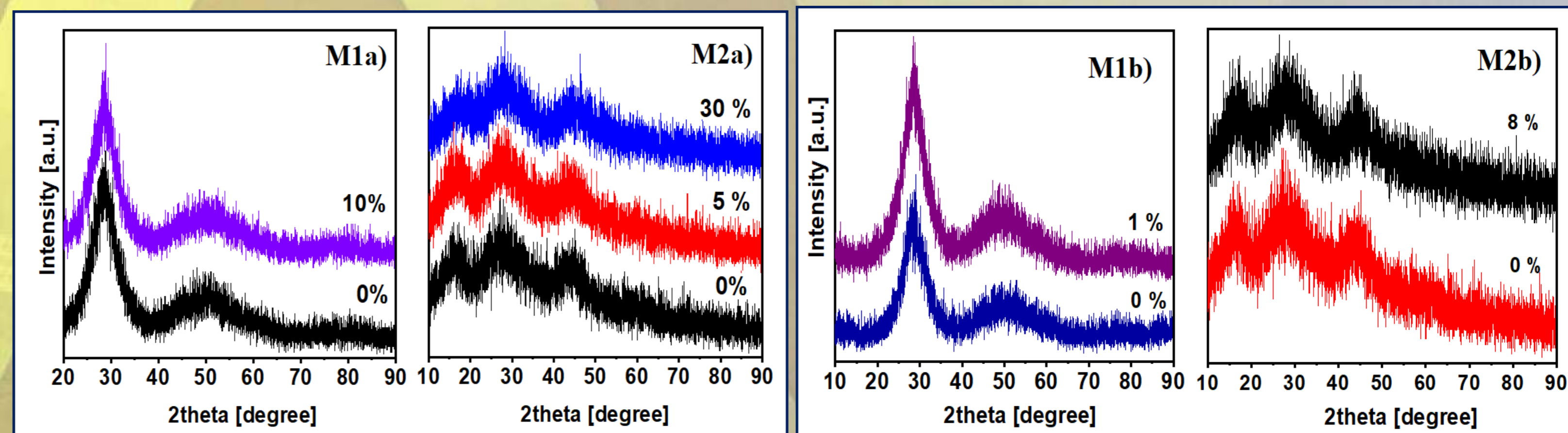


Fig. 2. XRD of *PbB-Wastes* products

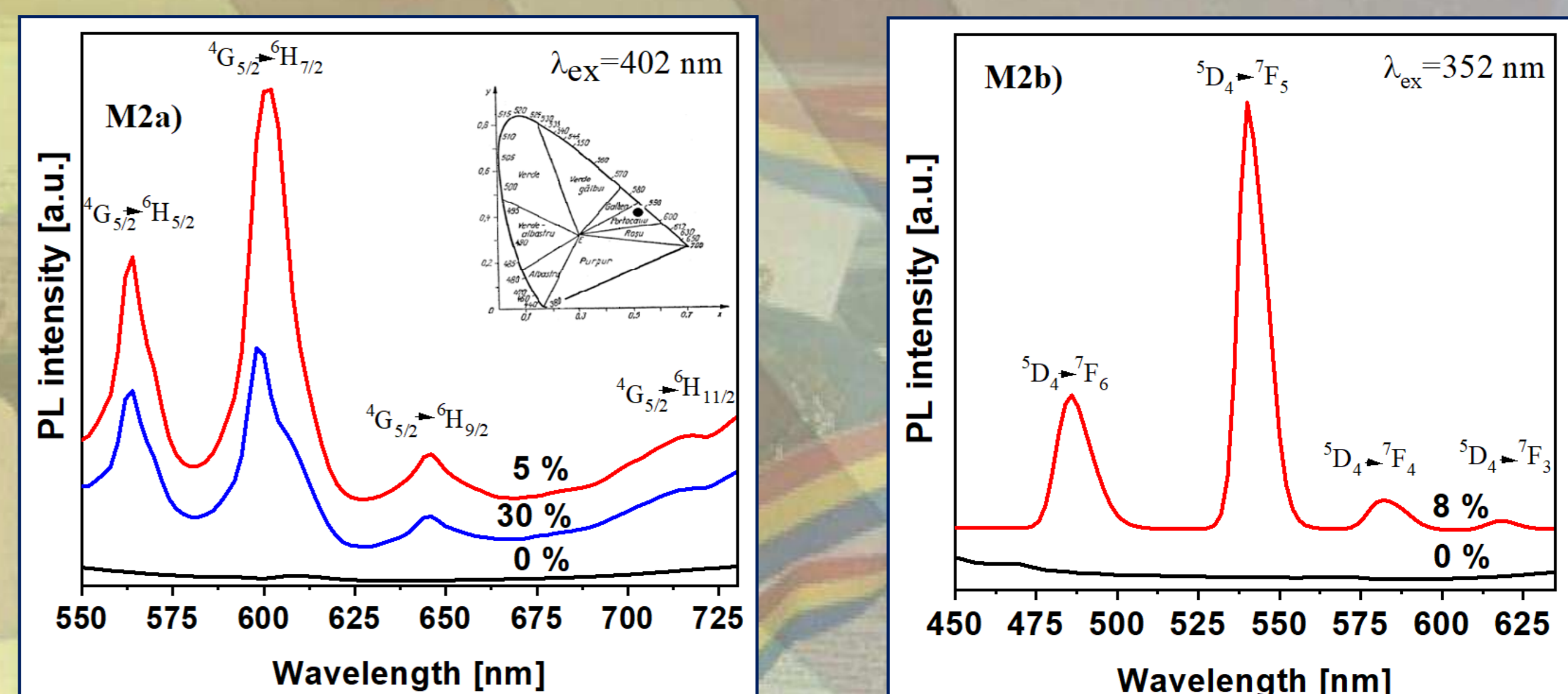


Fig. 3. PL spectra of *PbB-Wastes* products

CONCLUSIONS

- ☐ For radioactive waste with a high content of volatile component, it is recommended to incorporate them in [B₂O₃·4PbO] glass matrix (M1), at 700 °C, which will allow the immobilization of a content up to 10 mol % of uranium and 1 mol % of plutonium;
- ☐ For radioactive waste with a high level of uranium and plutonium, it is recommended to use the [4B₂O₃·PbO] glass matrix (M2), at 1000 °C, when a high rare earth content of to 30 mol % Sm₂O₃ and 8 mol % Tb₄O₇
- ☐ Obtained products have potential applications in the field of laser due to the luminescent properties of immobilized ions.

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NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT OF ISOTOPIC AND MOLECULAR TECHNOLOGIES

Donat St. 67-103, 400293, Cluj-Napoca, Romania
Phone: +40-264-584037; +40-731-030060 Fax: +40-264-420042
E-mail: itim@itim-cj.ro, Web: www.itim-cj.ro

