

New superconductors

from combinatorial techniques



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 AFOSR MURI "SEARCH FOR NEW SUPERCONDUCTORS
 FOR ENERGY AND POWER APPLICATIONS"



Motivation

- ❖ Merge known superconductors (SC) to produce new SC
- ❖ Proximity + solid state reaction + phase spread alloys
- ❖ Mixed-phase detection
- ❖ Path to success for new SC search

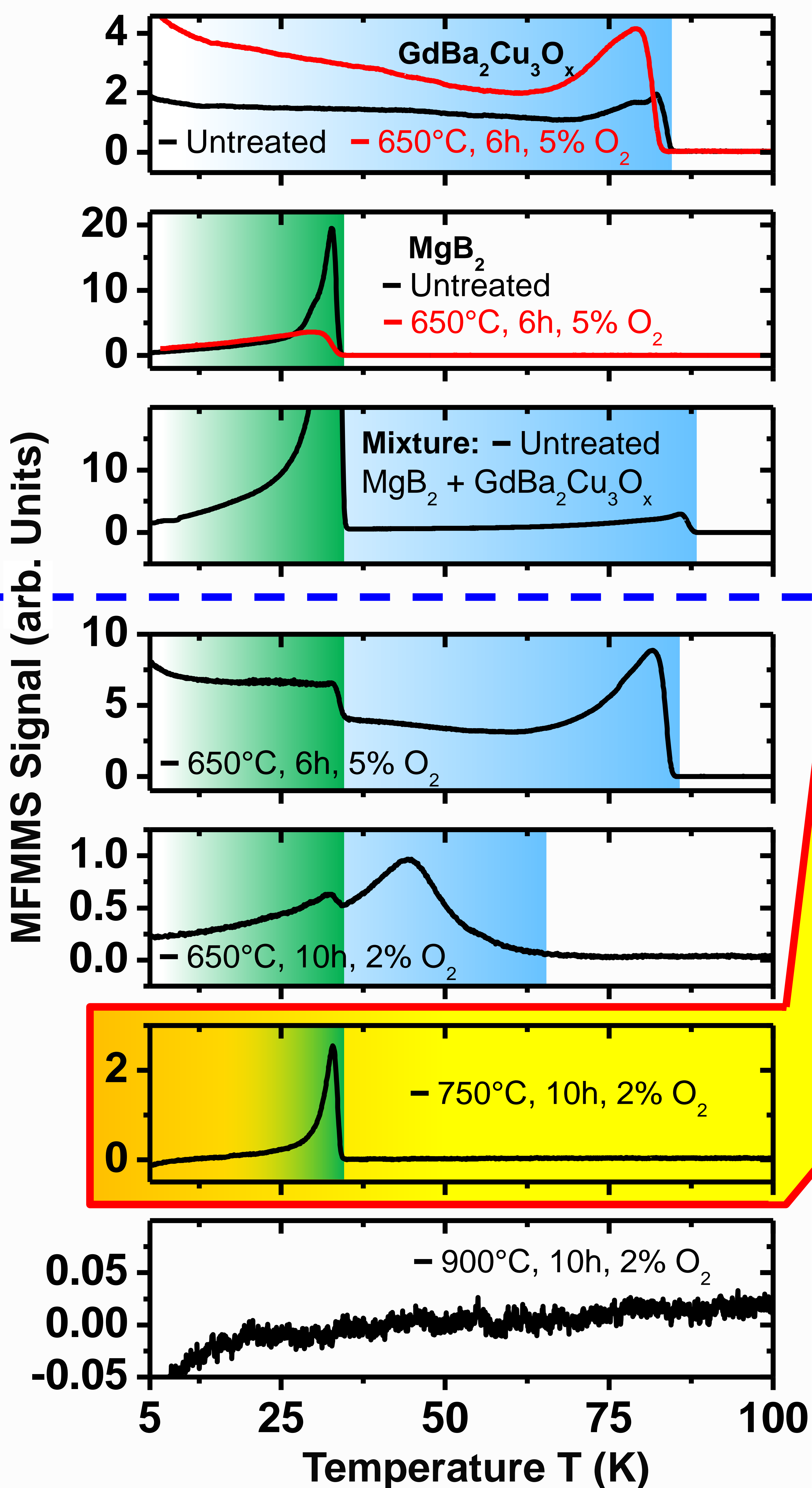
Magnetic Field Modulated Microwave Spectroscopy (MFMMS)

MgB₂ + GdBa₂Cu₃O_x Furnace Treatments

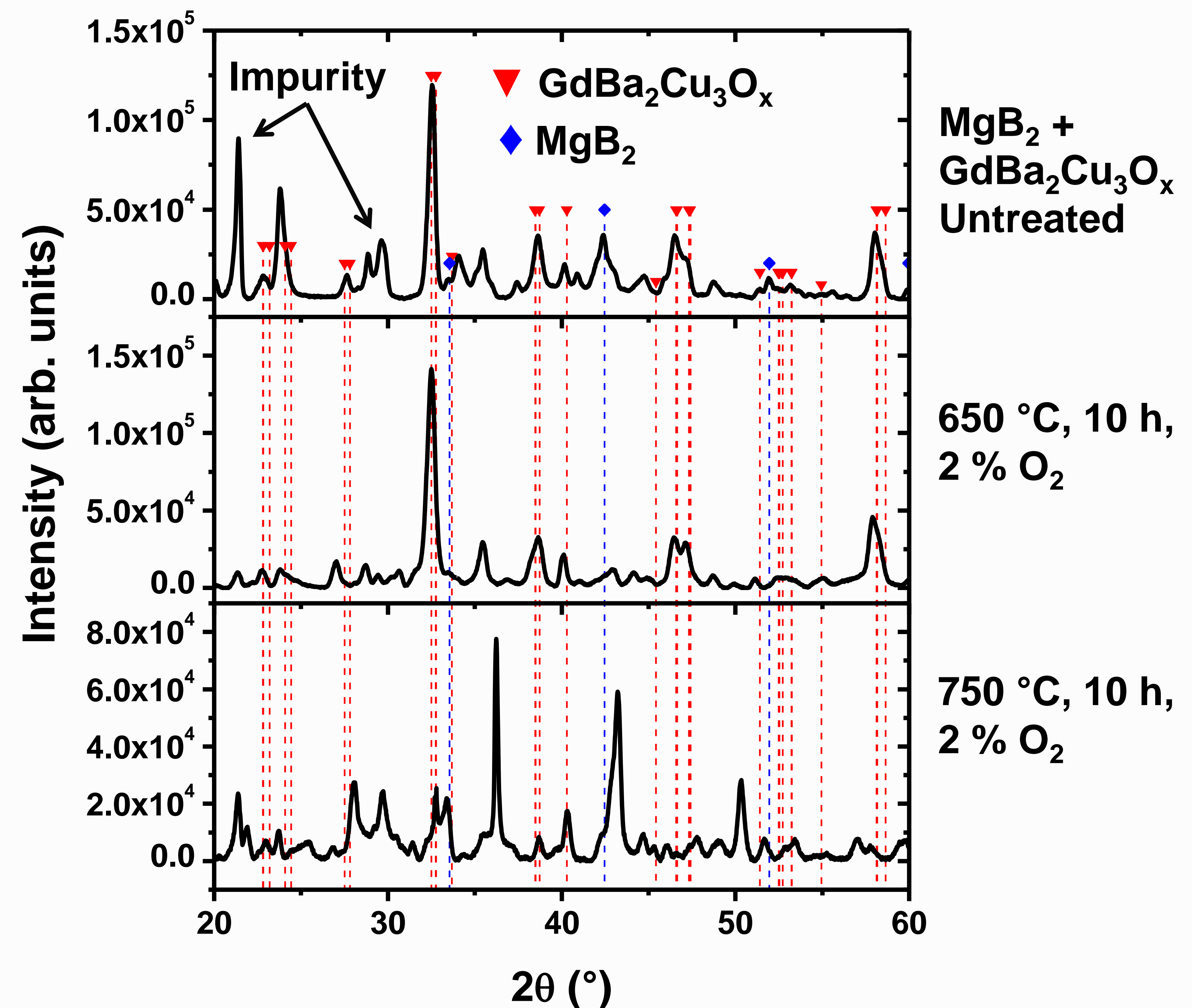
Peak ⇒ SC transition

Combination

Treatment

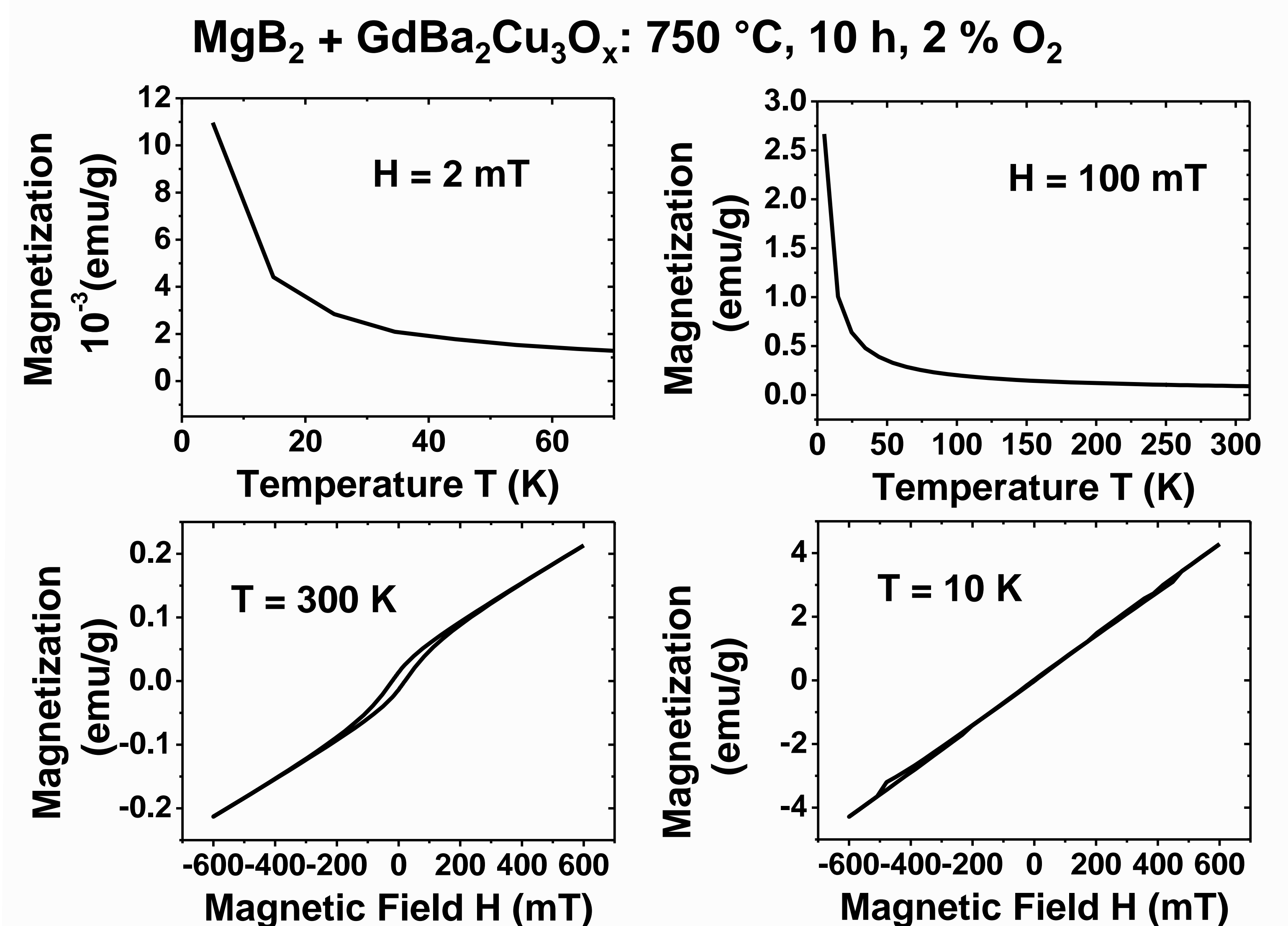


Wide-Angle X-ray Diffraction



Superposition of All Components

SQUID



No Sign of Superconductivity

Conclusions:

- ❖ Combinatorial approach to SC synthesis
- ❖ Full phase analysis
- ❖ Sensitive to weak SC phases (not detected by SQUID)
- ❖ Future: High-pressure/high-temperature synthesis

J. de la Venta *et al.*, Supercond. Sci. Technol. **24**, 075017 (2011)
 J. G. Ramirez *et al.*, to be published