Mixed oxides for thermochemical energy storage: study, characterization, and performance comparison

M. Battaglia[1]
Other authors: S. Sau[2]*, A.C. Tizzoni*[2]*, A. Spadoni*[2]*, N. Corsaro*[2]*, N. Roshan*[3]*, C. D'Ottavi*[1]*, S. Licoccia*[1,4]

[1] *University of Rome Tor Vergata - Department of Chemical Science and Technologies, Via della Ricerca Scientifica 1, 00133 Rome, Italy*

[2] *ENEA – Italian National Agency for New Technologies, Energy and Sustainable Economic Development, CR Casaccia, Via Anguillarese 301, 00196 Rome, Italy*

[3] *University of Rome Sapienza, Department of Chemical Engineering, Via Eudossiana 18, Rome, Italy*

[4] *Nast Center, University of Rome Tor Vergata, 00133 Rome, Italy*

matteo.battaglia@uniroma2.it

The activities carried out within the framework of the PTR 2025–2027 National Programme (Project 1.2/WP4, LA 4.21) are leading to the development and characterization of mixed oxides based on non-critical materials, with spinel or perovskite structures, for thermal energy storage applications. The selected powders were tested and cycled by thermogravimetric analysis (TGA) at different temperatures to evaluate their oxidation performance in air at 500, 600, and 700 °C and their reduction behaviour in nitrogen or air at 800, 900, and 1000 °C, thereby assessing their reactivity. The most promising material, considering its cost, environmental impact, chemical and physical stability, and ability to store and release heat in the 550–700 °C temperature range, was selected for further investigation. The properties of the identified material were further improved through pelletization and the incorporation of inert supports, with the aim of enhancing its volumetric energy density and stability over repeated thermochemical cycles. The best-performing synthesized pellets will be used in the fluidized-bed reactor (FBR) test campaign.