

The Serbian Society for Ceramic Materials
Institute for Multidisciplinary Research (IMSI), University of Belgrade
Institute of Physics, University of Belgrade
Center of Excellence for the Synthesis, Processing and Characterization of
Materials for use in Extreme Conditions "CEXTREME LAB" - Institute of
Nuclear Sciences "Vinča", University of Belgrade
Faculty of Mechanical Engineering, University of Belgrade
Center of Excellence for Green Technologies, Institute for Multidisciplinary
Research, University of Belgrade
Faculty of Technology and Metallurgy, University of Belgrade

PROGRAMME and the BOOK of ABSTRACTS

6CSCS-2022

6th Conference of
the Serbian Society for Ceramic Materials
June 28-29. 2022. Belgrade Serbia

Edited by:
Branko Matović
Aleksandra Dapčević
Vladimir V. Srdić

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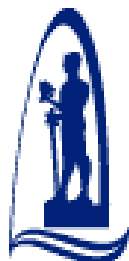


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**THE CATALYTIC DEGRADATION OF RO16 DYE UNDER
DARK AMBIENT CONDITIONS USING
La-Ni-Nb-O-BASED POWDERS**

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Dyes released from textile industries present a big threat to the environment, and remediation of wastewaters became one of the major scientific challenges. In recent years, there has been a great need for catalysts that would oxidize pollutants under dark ambient conditions without the use of external stimulants like light, temperature, or additional chemicals such as O₃, H₂O₂. Efficient work of these catalysts would significantly reduce the energy consumption. Among other materials, perovskite-type oxides with general formula ABO₃ emerged as possible catalysts for dye degradation in the dark conditions. Lanthanum nickelates with single (LaNiO₃) and layered perovskite structure (La₄Ni₃O₁₀, La₃Ni₂O₇, La₂NiO₄) showed good catalytic properties, due to the existence of nickel in two oxidation states (Ni²⁺ and Ni³⁺) and the oxygen non-stoichiometry in these materials [1].

This study presents structural, microstructural and catalytic properties of the LaNi_{1-x}Nb_xO₃-based (xNb = 0.000, 0,005 and 0,010; La-Ni-Nb-O) powders prepared by mechanical activation method. The XRD (X-Ray Diffraction) analysis revealed the existence of a multiphase oxide system, including layered structures of nickelates La_{n+1}Ni_nO_{3n+1} (n = 3, 2, 1, 0) and NiO phase in all La-Ni-Nb-O-based powders. Also, the HRTEM (High Resolution Transmission Electron Microscopy) analysis confirmed the presence of structural polytypes in these powders. The catalytic properties of La-Ni-Nb-O-based powders were investigated by degradation of the anionic azo dye, Reactive Orange 16 (RO16), under dark ambient conditions at different pH values (3, 6.5, 9.5 and 11) and temperature of 20 °C. The best catalytic efficiency in the degradation of RO16 dye showed the sample with x(Nb) = 0.010 in acidic solution, where the residual of RO16 dye was about 4.5 % after 330 minutes. The reusability test for this powder in degradation process of RO16 dye showed that the sample with x(Nb) = 0.010 retained its catalytic activity during three cycles.

1. W. Zhong *et al.*, *Appl. Catal. A, Gen.*, **549** (2018) 302.