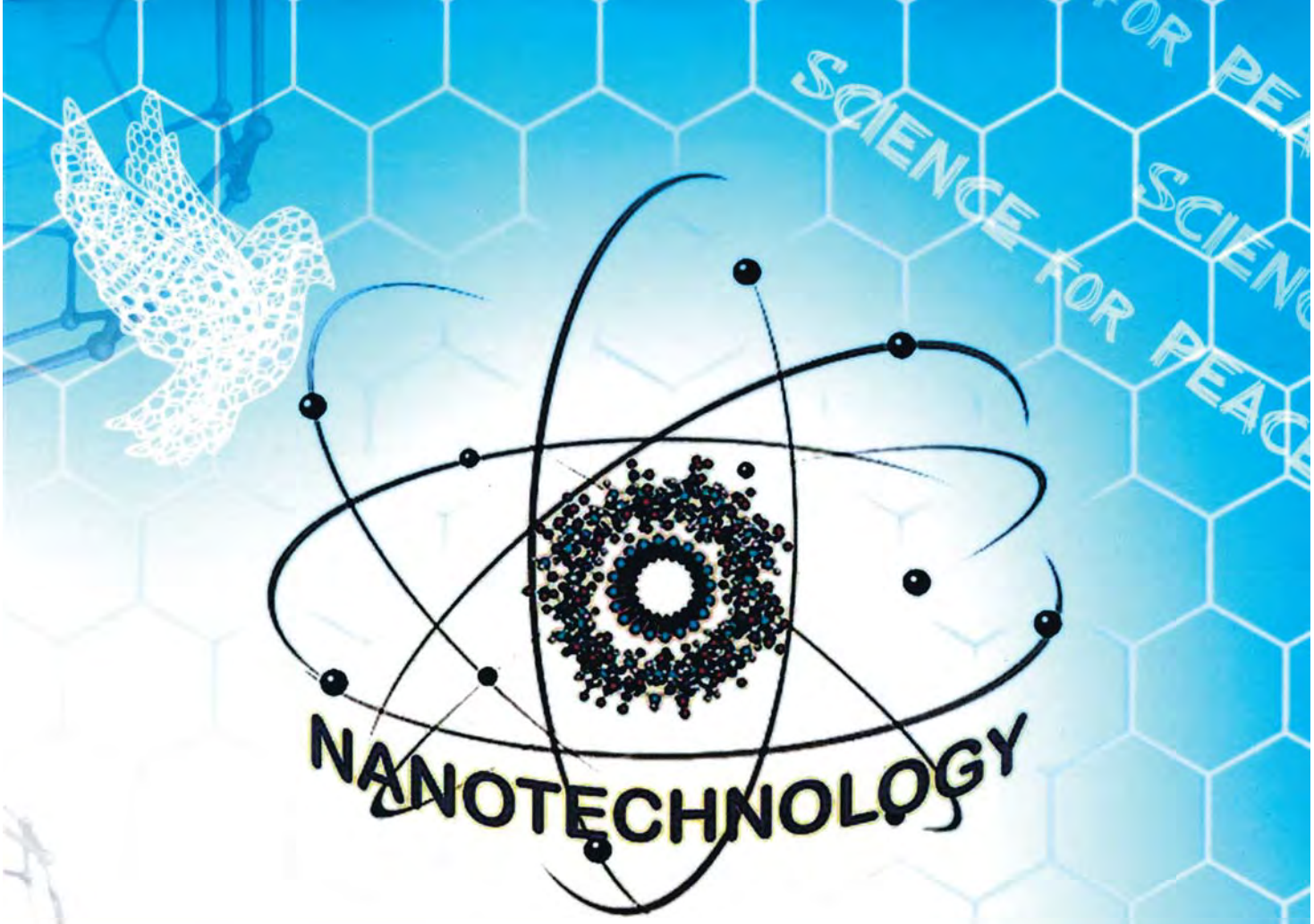

ABSTRACT BOOK

International research and practice conference:

NANOTECHNOLOGY AND NANOMATERIALS (NANO-2018)

27-30 August 2018
Kyiv, Ukraine

dedicated to the 100th Anniversary
of the National Academy of Sciences of Ukraine

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This book contains the abstracts of contributions presented at the International research and practice conference "Nanotechnology and Nanomaterials" (NANO-2018).

The NANO-2018 Conference was organized by the Institute of Physics of NAS of Ukraine with the participation of the Taras Shevchenko National University of Kyiv (Ukraine), University of Tartu (Estonia), University of Turin (Italy) and Pierre and Marie Curie University – Paris 6 (France).

NANO-2018 was the sixth conference in the series of NANO-conferences initiated by the Institute of Physics of NAS of Ukraine in 2012 in the framework of FP7 Nanotwining project. From year to year, they attract more attention and participants. In 2012, the first meeting was held in the format of International Summer School for young scientists «Nanotechnology: from fundamental research to innovations». The 2013 and 2014 conferences were organized in conjunction with the International Summer Schools for young scientists under the same title. In 2013, this event was attended by more than 300 scientists, in 2014-2016, 450 scientists took part and in 2017 it gathered above 700 participants from Ukraine, Poland, Italy, Estonia, France, Austria, Germany, Greece, Turkey, USA, Romania, Moldova, Czech Republic, Taiwan, Lithuania, Egypt, Iran, India, Algeria, Indonesia and other countries. In 2017 Organizer Committee has received more than 700 application forms from about 25 countries of the world.

The NANO-2018 conference brought together leading scientists and young researchers from many countries of the world. This year its topics were as follows: Nanobiotechnology for health-care; Nanochemistry and biotechnology; Nanocomposites and nanomaterials; Nanoobjects microscopy; Nanooptics and photonics; Nanoplasmonics and surface enhanced spectroscopy; Nanoscale physics; Nanostructured surfaces; Physico-chemical nanomaterials science.

This year the NANO-2018 Conference was organized in the framework of the NAS of Ukraine Program «Fundamental issues of creation of new nanomaterials and nanotechnologies» for 2015-2019.

Conference of this year is dedicated to celebration of 100 years of National Academy of Science of Ukraine foundation. It's a great honor for us to organized conference where our scientists can get, exchange and share experience with abroad colleagues, and it is pleasure to be part of this. We always will work in this direction.

Website of the Nano-2018 conference: http://nano-conference.iop.kiev.ua//

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Synthesis and properties of $CaCu_3Ti_4O_{12}$ and $La_{2-x}Sr_xNiO_4$ condenser materials with a colossal permittivity

Reshytko B.A., V'yunov O.I., Davydenko N.V., Belous A.G.

Solid State Chemistry Department, Vernadsky Institute of General and Inorganic Chemistry, NAS of Ukraine,
Palladina ave., 32/34, Kiev-03142, Ukraine.
E-mail: vyunov@ionc.kiev.ua

Materials of the systems $CaCu_3Ti_4O_{12}$ (CCTO) and $La_{2-x}Sr_xNiO_4$ (LSNO) are characterized by a colossal permittivity ($\varepsilon \sim 10^5$) and can be used as multilayer capacitors and microwave devices in cellular mobile phones. The dielectric properties of these materials depend on the microstructure (namely, grain size and density) and the processing conditions (namely, oxygen partial pressure, sintering temperature and cooling rate). In the literature, there are contradictions in the synthesis conditions of SSTO and LSNO, as well as in their characteristics.

The aim of this work was to synthesize ceramics based on $CaCu_3Ti_4O_{12}$ and $La_{2-x}Sr_xNiO_4$, to investigate their electrical and physical properties depending on a frequency, microstructure and preparation conditions.

CCTO and LSNO ceramics were synthesized in an air atmosphere by solid-state reactions technique using extra-pure $CaCO_3$, $CuCO_3 \cdot Cu(OH)_2$, TiO_2, B_2O_3, NiO, La_2O_3, $MnSO_4 \cdot 5H_2O$ and pure $SrCO_3$.

XRD data for powders mixture for preparation of $CaCu_3Ti_4O_{12}$ceramics showed the presence of additional phase CuO after grindingand heat treatment at 300 °C. At 800 °C, the CCTO phase was observed. At 1050 °C, single-phase CCTO with perovskite structure and sp. gr. Im-3 (204) was formed. The ceramic sample obtained is characterized by colossal permittivity ($\varepsilon \sim 5\times10^4$), and is of interest as potential candidate for capacitor applications.

Powders mixture for preparation of $La_{2-x}Sr_xNiO_4$ ceramics after grinding contain an additional phase $La(OH)_3$. At 600 °C, $La(OH)_3$ transformed again to La_2O_3, which XRD peaks were smooth and indicate the presence of defects in nanoparticles. At 900 °C, the $La_{1.7}Sr_{0.3}NiO_4$ phase was observed. At 1180 °C, single-phase LSNO with K_2NiF_4 structure and sp. gr. I4/mmm is formed. Ceramic samples are characterized by high conductivity, and would be of interest as a cathode material of a solid oxide fuel cell.

The work was carried out with the financial support from the research program of the Ukrainian The NAS "New functional substances and materials for chemical production" (Fine Chemicals).