ÇUKUROVA UNIVERSITY

INTERNATIONAL CONFERENCE ON CONDENSED MATTER AND MATERIAL SCIENCES

2019 | 14-19 October , Adana/ TURKEY

http://iccm2019.cu.edu.tr

Director: Prof. Dr. Bekir ÖZÇELİK

Local Organizing Committee

Halil İbrahim Yavuz
Sezen ÖZÇELİK

Honory Committee

Prof. Dr. Mustafa KİBAR (Rector of Cukurova University)

International Advisory Board

Prof.Dr. Javier CAMPO (SPAIN)
Prof.Dr. Xerman de la Fuente LEIS (SPAIN)
Prof.Dr. Luis Alberto ANGUREL (SPAIN)
Prof.Dr. Andres SOTELO (SPAIN)
Prof.Dr. Katsuya INOUE (JAPAN)
Prof.Dr. Vasudeva SIRUGURI (INDIA)
Prof.Dr. Garry MCINTYRE (AUSTRALIA)

Scientific Committee

M.Ali AKSAN (İnönü Univ.)
Canan AKSOY (KTÜ)
Naoyuki AMEMİYA (Japan)
Luis Alberto ANGUREL (Spain)
Lutfi ARDA (Bahçeşehir Univ.)
Alev AYDINER (KTÜ)
İbrahim BELENLİ (Abant İzzet Baysal Univ.)
Nejat BULUT (İYTE)
Javier CAMPO (Spain)
Florinda COSTA (Portugal)
Şükrü ÇAVDAR (Gazi Univ.)
Şükrü ÇELİK (Sinop Univ.)
Tolga DEPÇİ (İSTE)
Ahmet EKİCİBİL (Cukurova Univ.)
Yüksel ERGÜN (Anadolu Univ.)
Ayşe EROL (İst.Üniv.)
Mehmet ERTUĞRUL (Atatürk Univ.)
Ramazan ESEN (Cukurova Univ.)
Xerman de la FUENTE (Spain)
Ali GENCER (Ankara Uni.)
Oğuz GÜLSEREN (Bilkent Univ.)
Marian JASKULA (Poland)
Kazuo KADOWAKI (Japan)
Hiroshi KAGAYEMA (Japan)
Faruk KARADAĞ (Cukurova Univ.)
Hakan GÜNDOĞMUŞ (Hakkari Univ.)
Hakan GÜNGÜNEŞ (Hitit Univ.)
Hamide KAVAK (Çukurova Univ.)
Kazumasa IIDA (Japan)
Haluk KORALAY (Gazi Univ.)
Andrei KOVALEVSKY (Portugal)
Çağlıyan KURDAK (USA)
Igor MOROZOV (Russia)
Marwan MOUSA (Jordan)
Süleyman ÖZÇELİK (Gazi Univ.)
Sezen ÖZÇELİK (Hakkari Üniv.)
Kemal ÖZTÜRK (KTÜ)
Sultan ÖZTÜRK (KTÜ)
Özgür ÖZTÜRK (Kastamonu Üniv.)
Berdan ÖZKURT (Mersin Üniv.)
Lütfi ÖZYÜZER (İYTE)
Shahed RASEKH (Portugal)
M.Anis-ur-REHMAN (Pakistan)
Burcu SAVAŞKAN (KTÜ)
Anatoli SIDORENKO (Moldova)
Andres SOTELO (Spain)
Yoshihiko TAKANO (Japan)
Ebru Şenadım TÜZEMEN (Cumhuriyet Univ.)
Pan WEI (China)
Akiyasu YAMAMOTO (Japan)
H.Ibrahim YAVUZ (MSU)
Ali ZAOUI (France)

Invited Speakers

Luis Alberto ANGUREL
Ali BOZBEY
Javier CAMPO
Juan B.Carda CASTELLO
Adrian CRISAN
Tolga DEPÇİ
Yüksel ERGÜN
Ramazan ESEN
Ali GENCER
Oğuz GÜLSEREN
Samir KHENE
Andrei KAVALEUSKİ
Xerman de la Fuente LEIS
Kemal ÖZTÜRK
Sultan ÖZTÜRK
Halime Ö.PAKSOY
Shahed RASEKH
David Muñoz-ROJAS
Andres SOTELO
Yoshihiko TAKANO
Akiyasu YAMAMOTO
H.Ibrahim YAVUZ
Ali ZAOUI

I-11

New guidelines for oxide thermoelectrics: redox tuning and controlled interactions

A.V. Kavaleuski[1]

[1]*CICECO – Aveiro Institute of Materials, Department of Materials and Ceramic Engineering, University of Aveiro, 3810-193 Aveiro, Portugal*
Corresponding Author: akavaleuski@ua.pt

Development of thermoelectrics for high-temperature applications imposes several essential requirements on the material properties. In some energy-conversion scenarios the cost and thermal stability requirements may dominate over efficiency issues, making abundant, high-temperature-stable and low-toxic oxides an interesting alternative TEs. The talk will feature some promising strategies to design performing oxide-based thermoelectrics. Particular attention will be given to the approaches where the inherent redox flexibility of oxides is invoked for tailoring the TE properties through in-situ formation of nanocomposites with enhanced performance. Another strategy is based on a self-forming nanocomposite concept for ZnO-based thermoelectrics, where a controllable interplay between exsolution of the nanophases and modification of the host matrix suppresses the thermal transport, while imparting the high electrical performance. The mechanisms behind the observed enhancement in thermoelectric properties and specific pathways towards high TE performance in oxides will be proposed and discussed.

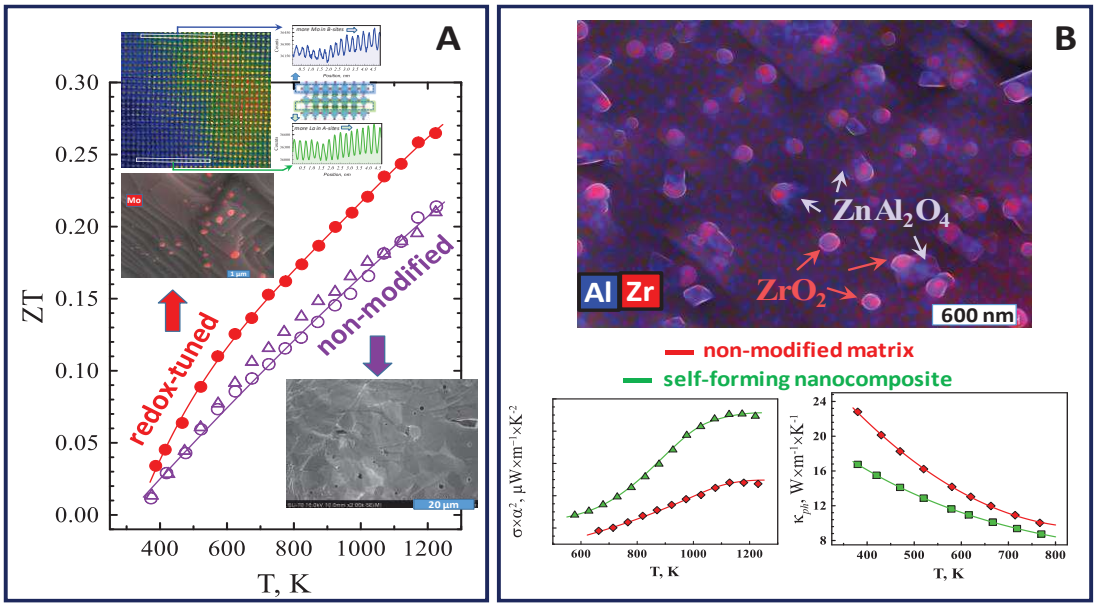

Fig. 1: *Comparison of the thermoelectric efficiency (ZT) in non-modified and redox-tuned $SrTiO_3$-based materials, and corresponding SEM/EDS and STEM -HAADF images (A). Representative microstructure and chemical mapping results for Zn(Al,Zr)O-$ZnAl_2O_4$-ZrO_2 nanocomposite and comparison of the power factor ($\sigma\times\alpha^2$) and thermal conductivity (κ_{ph}) in nanocomposite and non-modified matrix (B).*

Acknowledgements: projects CICECO-Aveiro Institute of Materials (ref. UID/CTM/50011/2019) and POCI-01-0145-FEDER-031875, financed by COMPETE 2020 Program and National Funds through the FCT/MEC and when applicable co-financed by FEDER under the PT2020 Partnership Agreement.