



Mediterranean Meeting on Materials and Their Applications



Program

3MA - 21
Faculty of Sciences and Technologies - FEZ
October 28-29, 2021

<https://fstf.fst-usmba.ac.ma/conferences/3MA2021/>

Preface

The meeting (3MA-21) is the second edition of a series of regular conferences bringing together researchers from countries around the Mediterranean Sea. These conferences are dedicated to Materials science and issues.

Materials science has provoked and contributed to the emergence of various nanomaterials, biomaterials, electronic, optical, magnetic materials, piezoelectric materials, ceramics, glasses, polymers, metal alloys, smart materials, semiconductor materials and design of complicated structures through the innovation of technology by the advancements in the study of materials science. It is very important and nice to have a mix between theory, basic science, sharing best practices and practical recommendations.

3MA is an international conference focused on fundamental properties and processing of ceramic and electroceramic materials and their applications in electronic, electro/mechanical, magnetic, dielectric, and optical components, devices, and systems. 3MA addresses emerging needs, opportunities and key challenges in the field of materials and their applications.

The objectives of this conference are to present advancements achieved by materials scientists in diverse fields, to present the latest techniques in materials synthesis/characterization/fabrication and to provide opportunities for networking and scientific collaborations.

Students are especially encouraged to participate in the meeting. The technical program includes plenary talks, invited lectures, contributed papers and poster presentations, and open discussions, as well as networking opportunities to find collaborations, and facilitate scientific, and technical advances.

Welcome message from Chairs

On behalf of the 3MA organizing committee, we are honored and delighted to welcome all presents and participants to the [Mediterranean Meeting on Materials and their Applications \(3MA-21\)](#) held in Fez, the imperial city.

As a conference chairs of 3MA-21, we know that the success of the conference depends ultimately on the many people who have worked with us in planning and organizing both the technical program and supporting social arrangements. In particular, we thank the Program Chairs for their wise advice and brilliant suggestion on organizing the technical program; the Program Committee for their thorough and timely reviewing of the papers, and our sponsors who have helped us to keep down the costs 3M1-2021 for all participants. Recognition should go to the Organizing Committee members who have all worked extremely hard for the details of important aspects of the conference programs and activities. Lastly, we would like to thank all of the conference participants for their contributions, which are the foundation of this conference.

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- **M. Zouhairi** (FS – Meknès Morocco)

3M-21 Program

Thursday 28 October 2021			
08h30-09h00	Registration		
09h00-09h30	Opening ceremony and Welcome		
09h30-10h30	<p>Chairman: Pr. M.HADDAD</p> <p>Keynote speech 1 : Pr Pr. Adam DUONG</p> <p><i>Inventer avec intention : le défi des matériaux fonctionnels pour les technologies énergétiques durables</i></p>		
10h30-11h00	Coffee Break		
11h00-12h40	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;"> Oral session 1 : Synthesis & structure 1 </td> <td style="text-align: center;"> Oral session 2 : Hybrid Materials 1 </td> </tr> </table>	Oral session 1 : Synthesis & structure 1	Oral session 2 : Hybrid Materials 1
Oral session 1 : Synthesis & structure 1	Oral session 2 : Hybrid Materials 1		
12h40-14h00	Lunch		
14h30-16h10	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;"> Oral session 3 : Physical properties of ceramics </td> <td style="text-align: center;"> Oral session 4 : Synthesis & structure 2 </td> </tr> </table>	Oral session 3 : Physical properties of ceramics	Oral session 4 : Synthesis & structure 2
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16h10-16h30	Break coffee & Posters		
16h30-18h30	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;"> Oral session 5 : Specific Materials </td> <td style="text-align: center;"> Oral session 6 : Theories, Methods and models </td> </tr> </table>	Oral session 5 : Specific Materials	Oral session 6 : Theories, Methods and models
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	Friday 29 October 2021	
09h00-10h00	<p style="color: yellow;">Chairman: Pr. S. SYOURI</p> <p>Keynote speech 2 : Pr . Farid .ABDI</p> <p><i>Les matériaux pérovskites fonctionnels : synthèse et propriétés</i></p>	
10h00-10h30	Coffee break & Posters	
10h30-12h30	Oral session 7 : Synthesis & structure 3	Oral session 8 : Materials physic
12h30-13h00	Closure Ceremony	

IMPORTANT AUTHOR INFORMATIONS

KEYNOTE presentations: 40 minutes presentation + 5 minutes discussion

Oral presentations: 15 minutes presentation + 5 minutes discussion. Have your presentation file on USB stick with you

Poster presentations: size A0, portrait orientation.

You are kindly asked to stay near your presentations for discussions or dialogue.

You are kindly asked to remove your poster after the meeting ends. Posters left on the boards will be disposed off and will not be stored

SESSION 1 : SALLE DES CONFERENCES Synthesis and Structure 1 Chairman: Pr M. Lachkar	
11H00-11H20	ID 24: Electrical and dielectric properties of $(1-x-y)(\text{Na}_{0.5}\text{Bi}_{0.5})\text{TiO}_3-x\text{BaTiO}_3-y(\text{K}_{0.5}\text{Bi}_{0.5})\text{TiO}_3$ lead-free ceramics Mohammed Mesrar, Taj-Dine Lamcharfi, Nor-Said Echatoui and Farid Abdi
11H20-11H40	ID 22: Structural and dielectric properties of Mg-Doped PbTiO_3 ceramics synthesized by consecutive combination of sol-gel and hydrothermal methods at low temperature El Houcine Lahrar, Ouafae Elghadraoui, Mohammed Zouhairi, Ahmed Harrach, Tajeddine Lamcharfi and El Houssine Elghadraou
11H40-12H00	ID 41: Synthesis, structural, optical and dielectric properties of a new series of polyoxometalate salts: Effect of cesium content Imane El Arrouji, Asmae Ghoumit, Jamil Toyir and Abdallah Oulmekk
12H00-12H20	ID 1: Structural and dielectric properties of Y-doped BaTiO_3 ceramics prepared by sol-gel method Aziz Nfissi, Yahya Ababou, Mounir Belhajji, Salaheddine Sayouri and Lahoucine Hajji
12H20-12H40	ID 69: Effect of Zr substitution at Ba site en structural and dielectric properties of BTF ceramic Gouitaa Najwa, Lamcharfi Taj-Dine, Abdi Farid, Fatima Zahra Ahjyaje.

SESSION 2 : SALLE DES REUNIONS 1 Hybrid Materials 1 Chairman: Pr A. Belaaraj	
11H00-11H20	ID 32: Two-dimensional organic-inorganic with a wide bandgap: optical and dielectric properties Said Kassou, Obaida Tahiri, Najwa Gouitaa, Mahmoud Ettakni, Lamcharfi Taj-Dine and Abdesselam Belaaraj
11H20-11H40	ID 26: Crystal structure analysis, Optical and Dielectric properties study of a 2D Perovskite Hybrid Mn-Cl ₄ Based Tahiri Obaida, Kassou Said, El Mrabet Rajae, Ahabboud Malika, Lamcharfi Taj-Dine and Belaaraj Abdesselam
11H40-12H00	ID 33: One-step sping coating deposition of $\text{CH}_3\text{NH}_3\text{PbI}_3$ and annealing time for high quality perovskite films Soufian Baba, Driss Ettarchouch, Elmustafa Ouaaka, Said Kassou and Mahmoud Ettakni
12H00-12H20	ID 68: Synthesis, Characterization and Catalytic Activity Of new Organic-inorganic hybrid phosphite $(\text{C}_2\text{H}_{10}\text{N}_2)\text{Ni}(\text{H}_2\text{PO}_3)_2\text{Cl}_2$ Asmae Ben Abdelhadi, Safaa Hidaoui, Rachid Ouarsal, Mohamed Khaldi, Brahim El Bali and Mohamed Lachkar
12H20-12H40	ID 65: Synthesis, spectroscopic and catalytic studies of a new hybrid cobalt phosphate Safaa Hidaoui, Najlaa Hamdi, Mohamed Akouibaa, Mohammed Lachkar and Brahim El Bali

SESSION 3 : SALLE DES CONFERENCES Physical properties of ceramics Chairman: Pr D. Bria	
14H30-14H50	<p>ID 20 : Improved microstructural, high temperature dielectric, and complex impedance spectroscopic properties of KBT-modified NBT-xKBT lead-free ferroelectric ceramics</p> <p>Mohammed Mesrar, Taj-Dine Lamcharfi, Nor-Said Echatoui, Farid Abdi, Abdehalim Elmrabet and Mohammed Zouhairi</p>
14H50-15H10	<p>ID 3 : Physicochemical characterization of a plant waste from the Asteraceae family</p> <p>Meryem Hajji Nabih, Maryam El Hajam, Hamza Bouluka, Nouredine Idrissi Kandri and Abdelaziz Zerouale</p>
15H10-15H30	<p>ID 30 : Elaboration and physico-chemical characterization of (1-x) CCTO-x PL0.2T by hybrid method</p> <p>Malak Slaoui, Najwa Gouitaa, Amina Lahrichi A. Harrach, F. Abdi, T. Lamcharfi</p>
15H30-15H50	<p>ID 40 : Structural and dielectric properties of (1-x) Pb(Zr0.52Ti0.48)O3 – x BiFeO3 system at $0 \leq x \leq 1.00$</p> <p>Malika Ahabboud, Fatimazahra Ahjyaje, Farid Abdi and Taj-Dine Lamcharfi</p>
15H50-16H10	<p>ID 70 : Structural and dielectric properties of (1-x)CT-xFT multiferroic composites</p> <p>Gouitaa Najwa, Fatima Zahra Ahjyaje, Lamcharfi Taj-Dine, Abdi Farid and N. Hadi.</p>

SESSION 4 : SALLE DES REUNIONS 1 Specific Materials Chairman: Pr N. Idrissi Kandri	
14H30-14H50	<p>ID 47 : Modelling of continuous adsorption and fixed bed column Adsorption of urban wastewater pollutants using a natural material: almond bark</p> <p>Ibtissame Mansouri, Said Amhaouch, Amal Lahkimi, Ghita El Mouhri, Mehdi Chaouch, Nouredine Elouatassi and Hicham Bekkar</p>
14H50-15H10	<p>ID 2 : Physicochemical characterization of Almond residues from Fez-Meknes region</p> <p>Hamza Bouluka, Maryam El Hajam, Meryem Hajji Nabih, Nouredine Idrissi Kandri and Abdelaziz Zerouale</p>
15H10-15H30	<p>ID 67 : Synthesis, structural and vibrational properties of a new manganese hybrid materiel (NH₂)₂Mn(HPO₃)₂.H₂O</p> <p>Asmae Ben Abdelhadi, Mohamed Akouibaa, Amine Fraoui, Rachid Ouarsal, Brahim El Bali and Mohammed Lachkar</p>
15H30-15H50	<p>ID 49 : New and Efficient Way to synthesis Mesoporous Carbon Materials from Lignocellulosic Waste by catalytic hydrothermal carbonization: Optimization and application to dyes adsorption</p> <p>Façal El Ouadrhiri, Majda El Yemni, Amal Lahkimi, Abdelhadi Lhassani, Mustapha Taleb and Mehdi Chaouch</p>
15H50-16H10	<p>ID 48 : Caractérisation et valorisation d'un nouveau biomatériau extrait du cactus marocain dans le traitement des margines par le procédé de coagulation floculation</p> <p>Ibtissame El Mansouri, Amal Lahkimi, Faical Elouadrhiri, Mehdi Chaouch, Nouredine Elouatassi and Hicham Bekkar</p>

SESSION 5 : SALLE DES REUNIONS 1 Synthesis & structure 2 Chairman : Pr M. El Aatmani	
16H30-16H50	ID 10: Contribution to the study of the structural and dielectric properties of magnesium doped BaTiO ₃ material Ouafae Elghadraoui, Mohammed Zouhairi, Ahmed Harrach, Taj-Edine Lamcharfi and Farid Abdi
16H50-17H10	ID 54: Structural properties of strontium doped barium titanate ceramics A. Elbasset, T. Lamcharfi, F. Abdi, S. Sayouri , N.S Echatoui and M. Mesrar.
17H10-17H30	ID 35: Structural and dielectric study of nickel-doped perovskite materials PbTiO ₃ and BaTiO ₃ Salma Majdoub, Ouafae El Ghadraoui, Youssef Sakout, Mohammed Zouhairi, Ahmed Harrach, Taj-Dine Lamcharfi and El Houssine El Ghadraoui
17H30-17H50	ID 25: Investigation by Rietveld refinement and Raman spectroscopy for Pb _{1-x} Sr _x TiO ₃ ceramics prepared by hydrothermal method El Houcine Lahrar, Ouafae Elghadraoui, Mohammed Zouhairi, Ahmed Harrach, Tajeddine Lamcharfi and El Houssine Elghadraoui.
17H50-18H10	ID 66: Synthesis, crystal structure and catalytic activity of a new organic-inorganic hybrid nickel phosphite(C ₂ N ₂ H ₁₀)[Ni(H ₂ O) ₆](HPO ₃) ₂ Akouibaa Mohamed, Hamdi Najlaa, Fraoui Amine, Ben Abdlehadhi Asmae, Zerrouk Mohammed, Ouarsal Rachid, Rakib Souâd, Lachkar Mohammed and El Bali Brahim
18H10-18H30	ID 12: Analysis and physicochemical study of non-stoichiometric materials of perovskite type: MFeO _{3-x} (M=Ca, Sr, Ba) Youssef Sakout, Ouafae Elghadraoui, Mohammed Zouhairi, Salma Majdoub, Ahmed Harrach and Najib Tijani

SESSION 6 : SALLE DES REUNIONS 2 Theories, Methods and models Chairman: Pr N. Massaif	
16H30-16H50	ID 61: Theoretical study of the magnetic and magnetocaloric properties of the ZnFe ₃ N antiperovskite Smail Amraoui, Abdellah Feraoun and Mohamed Kerouad
16H50-17H10	ID 5: Study of structural, electronic, magnetic, thermodynamic and thermoelectric properties of half Heuster HgCrP: First principales calculations Mohamed El Haoua, Najib Benzakour and Ahmed Hourmatallah
17H10-17H30	ID 6: Theoretical study of X ₄ N (X=Sc or Y) antiperovskite by first principle and Monte Carlo simulation Abdelouahid Azouaoui, Najib Benzakour and Ahmed Hourmatallah
17H30-17H50	ID 60: Multichannel filters with high performance by using the transfer matrix in a one dimensionnel defective photonic star waveguides structure Tarik Touiss, Amina Ghabane, Ilyass El Kadmiri, Youssef Ben-Ali and Driss Bria
17H50-18H10	ID 8: Theoretical study of lattice defect structures in nonstoichiometric LiNbO ₃ and LiTaO ₃ Hamza Hboub and Nouredine Masaif
18H10-18H30	ID 59: Analytical study of lignocelluloses wood materials (Cedrus Atlantica and Argania Spinosa): Application to structural analysis by means FTIR and XRD Yousra Bouramdane, Mustapha Haddad, Mohamed El Amraoui and Abdellatif Boukir

SESSION 7 : SALLE DES CONFERENCES Synthesis & structure 2 Chairman: Pr M. Abarkan	
10H30-10H50	<p>ID 18 : Effect of low temperature on the structural and electrical properties of $(1-x)(\text{Na}_{0.5}\text{Bi}_{0.5})\text{TiO}_3-x(\text{K}_{0.5}\text{Bi}_{0.5})\text{TiO}_3$ ceramics synthesized by the hydrothermal process</p> <p>Mohammed Mesrar, Najwa Gouitaa, Taj-Dine Lamcharfi, Nor-Saïd Echatoui, Farid Abdi, Abdelhalim Elbasset and Fatima Zahra Ahjyaje</p>
10H50-11H10	<p>ID 4 : Structural, dielectric, electrocaloric and energy storage properties of $\text{Ba}_{0.85}\text{Ca}_{0.15}\text{Zr}_{0.1}\text{Ti}_{0.9}\text{O}_3$ ceramics synthesized by sol-gel method</p> <p>Afaak Lakouader, Hanane Mezzourh, Youness Hadouch, Daoud Mezzane, Mbarek Amjoud, Lahoucine Hajji, Elhassan Choukri and Igor Lukyanchuk.</p>
11H10-11H30	<p>ID 52 : Dielectric behaviour of the $\text{Ba}_{1-x}\text{Sr}_x\text{TiO}_3$ ferroelectric ceramic in the frequency range of 1kHz to 2MHz.</p> <p>A. Elbasset, F. Abdi, T. Lamcharfi, M. Mesrar, N.S. Echatoui and S. Sayouri.</p>
11H30-11H50	<p>ID 71 : Ritveld refinement and dielectric properties of Fe doped CT ceramic for $x=0.0$ to 0.6 of Fe content</p> <p>Gouitaa Najwa, Lamcharfi Taj-Dine, Abdi Farid, Echatoui Nor-Said and N. Hadi.</p>
11H50-12H10	<p>ID 42 : Study of the structural optique and dielectric properties of pure and Fe doped $\text{Pb}(\text{Zr}_{0.52}\text{Ti}_{0.48})\text{O}_3$ ceramics synthesized by sol gel state</p> <p>Malika Ahabboud, Fatimazahra Ahjyaje, Farid Abdi, Taj-Dine Lamcharfi and Zouhairi Mohammed</p>
12H10-12H30	<p>ID 45 : Synthesis and characterization of MTW - type zeolite prepared from near - neutral fluoride aluminosilicate gels.</p> <p>Jamal Eddine Hazm, Abdallah Oulmekki, Chakib Ameziane Hassani, Ali Driouiche and Mustapha Ijjaali</p>

SESSION 8 : SALLE DES REUNIONS 1 Physical properties of ceramics 2 Chairman: Pr A. Rjeb	
10H30-10H50	<p>ID 29 : Electronic, optical, and thermoelectric properties of Cs_{1-x}Rb_xPbBr₃ perovskite Semiconductor</p> <p>Elmustafa Ouaaka, Said Kassou, Salaheddine Sayouri and El Mostafa Khechoubi</p>
10H50-11H10	<p>ID 34 : Dielectric and transition mechanism of metal halide perovskites 2D</p> <p>Mahmoud Ettakni, Driss Ettarchouch, Soufian Baba, Obaida Tahiri, Abdesselam Belaaraj, El Mostafa Khechoubi and Said Kassou</p>
11H10-11H30	<p>ID 50 : Study of Dielectric, Structural and Microstructure Properties of pure and Mg-doped LiTaO₃ Ceramic.</p> <p>Jaafar Khalfaoui, Najwa Gouitaa, Taj-Edine Lamcharfi, Farid Abdi and Malika Ahabboud</p>
11H30-11H50	<p>ID 55 : Structural Behavior of Lanthanum -doped Barium Titanate Ceramic Prepared by sol-gel method</p> <p>Adil Moutaouaffiq, Abdelilah Rjeb and Salaheddine Sayouri</p>
11H50-12H10	<p>ID 43 : Synthesis, Crystal structure, and Magnetic Properties of a New Mixed-Valence diphosphate: Co₅Fe₂ (P₂O₇)₄</p> <p>Asmae Ghoumit, Abdallah Oulmekki, Jamil Toyir, Hafssa Lamsaf, Imane El Arrouji, Jamal Eddine Hazm, Ali Driouiche and Mustapha Ijjaali</p>
12H10-12H30	<p>ID 13 : The effect of yttrium (Y) on the structural and dielectric properties of BaTiO₃ prepared by the hydrothermal method</p> <p>Hafes Ed-Dnoub, Ouafae Elghadraoui, Zouhairi Mohammed, Harrach Ahmed, Tajeddine Lamcharfi and El Houssine Elghadraoui.</p>

POSTERS : HALL

- ID 9:** Theoretical study of Isoindigo-Based photosensitizers for dye sensitized solar cells (DSSCs)
Rahma El Mouhi, Asmae Fitri, Adil Touimi Benjelloun, Souad Elkhattabi, Mohammed Benzakour and Mohammed Mcharfi
- ID 11:** Synthesis and characterizations physico-chemical of Yttrium doped lithium niobate powders
Ouafae Elghadraoui, Mohammed Zouhairi, Ahmed Harrach, Taj-Edine Lamcharfi and Farid Abdi
- ID 14:** Modeling of flocculation effect and pulp parameters on the performance of vacuum filtration of phosphate slurry using design of experiments methodology
Ahmed Alalou, Mohammed El Asri, Ahmed Boulahna, Zouahir Hafid, Ali Bouali and Amine El Yazghi Ezzaher
- ID 15:** Study of MT influence on structural and dielectric properties of PZT ceramics
Gouitaa Najwa, Mesrar Mohamed, Lamcharfi Taj-Dine, Abdi Farid and Echatoui Nor-Said
- ID 16:** Influence of FT addition on structural and dielectric properties of (1-x)PZT-xFT composites prepared by hybrid method.
Gouitaa Najwa, Mesrar Mohamed, Lamcharfi Taj-Dine, Abdi Farid and Fatima Zahra Ahjyaje
- ID 17:** An investigation of the structural and electrical properties in lead-free (1-x)(Na_{0.5}Bi_{0.5})TiO₃-xBaTiO₃ ceramics: the impact of the preparation method
Mohammed Mesrar, Najwa Gouitaa, Taj-Dine Lamcharfi, Nor-Said Echatoui, Farid Abdi, Abdelhalim Elbasset and Fatima Zahra Ahjyaje
- ID 21:** Phase structure and dielectric properties of (1-x-y)NBT-xBT-yKBT ceramics obtained via hydrothermal synthetic approach
Mohammed Mesrar, Taj-Dine Lamcharfi, Nor-Said Echatoui, Farid Abdi, Abdehalim Elbasset and Fatima Zahra Ahjyaje
- ID 23:** Relaxation and phase-transition characteristics of (Na_{0.5}Bi_{0.5})TiO₃ processed by sol-gel method
Mohammed Mesrar, Taj-Dine Lamcharfi, Nor-Said Echatoui, Farid Abdi, Abdehalim Elbasset and Fatima Zahra Ahjyaje
- ID 27:** Morphological and Molecular crystal Study of the Hybrid Perovskite (CH₃-(CH₂)₆-NH₃)ZnCl₄
Rajae El Mrabet, Obaida Tahiri and Abdesselam Belaaraj
- ID 28:** Synthesis, crystal structure, thermal and dielectric characterization of the hybrid perovskite [CH₃-(CH₂)₈-NH₃]NZnCl₄
Rajae El Mrabet, Obaida Tahiri and Abdesselam Belaaraj
- ID 31:** Effect of annealing temperature on the performance of Perovskite solar cells
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- ID 33:** One-step spin coating deposition of CH₃NH₃PbI₃ and annealing time for high quality perovskite films
Soufian Baba, Driss Ettarchouch, Elmustafa Ouaaka, Said Kassou and Mahmoud Ettakni

- ID 37:** Manufacture of lightweight aggregate destined for concrete
Hamza Mesrar, Raouf Jabrane and Laila Mesrar
- ID 38:** Physicochemical and mineralogical characterization of clay bricks
Hamza Mesrar, Raouf Jabrane and Laila Mesrar
- ID 39:** The difference of Lithium-ion batteries state of charge estimation method between: model-based with Kalman filter family and machine learning
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- ID 44:** Effect of polymer concentration on clay-layers spacing and adsorption isotherms: Scaling theory models
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- ID 51:** The effect of Erbium doping on the structural, electrical and dielectric properties of the PT compound synthesis by the Sol-gel route
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- ID 53:** Phase diagrams and hysteresis behavior of mixed spin-5/2 and spin-2 Ising nanographene layer
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- ID 56:** Synthesis and study of physico-chemical properties of organic-inorganic hybrid perovskite $\text{CH}_3\text{CH}_2\text{NH}_3\text{BaCl}_3$
Daoudy Mahjoub, Gouitaa Najwa, Ahjyaje Fatima Zahra, Abdi Farid and Lamcharfi Taj-Edine
- ID 57:** Synthesis and physico-chemical study of $(\text{C}_6\text{H}_5\text{CH}_2\text{NH}_3)_2\text{BaCl}_4$ hybrid perovskite
Daoudy Mahjoub, Gouitaa Najwa, Ahjyaje Fatima Zahra, Abdi Farid and Lamcharfi Taj-Edine
- ID 58:** Characterization of wood material by Raman spectroscopy, EDS elementary technique and SEM morphological study: Application to chemometry.
Yousra Bouramdane and Abdellatif Boukir
- ID 62:** Study and characterization of Ba-doped $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ ceramics
Yassine El-Mernissi, Najwa Gouitaa, Taj-Edine Lamcharfi and Farid Abdi
- ID 63:** Synthesis and characterization of The $(1-x) \text{PbZr}_{0.52}\text{Ti}_{0.48}\text{O}_3 - x\text{CoFe}_2\text{O}_4$ composite ceramics with $0 \leq x \leq 1$ prepared by two chemical methods
Malika Ahabboud, Lamcharfi Taj-Dine and Farid Abdi
- ID 64:** Synthesis and physico-chemical study of multiferroic compounds based on LaFeO_3
Amina Maou, Najwa Gouitaa, Taj Dine Lamcharfi and Farid Abdi