



JDD2023 :8-9 Mai 2023

---

## Optical and electrical characterizations of the synthesized perovskite material the CsPbBr<sub>3</sub> for optoelectronic applications.

**Auteurs :** Brahim hafedh <hafedhbr@gmail.com> (1), Hassen fredj <hassenfredj@gmail.com> (1), Mghaieth ridha <ridha.mghaieth123@gmail.com> (1)

**Affiliations :** 1 - Laboratoire de Micro-Optoélectronique et Nanostructures (LMON) ( Tunisie)

**Code :** 463279

**Commission :** physique

**Salle :** 1

**Mots clés :** Perovskite, CsPbBr<sub>3</sub>, Synthesis, optical characterization, electrical characterization, Schottky diode, optoelectronic, photovoltaic

### Abstract :

To maximize the performance of optoelectronic devices and to reduce the fabrication cost of these devices, the scientific community has been investigating low-cost materials. It is in this context that we synthesized the CsPbBr<sub>3</sub>, the low-cost all-inorganic perovskite material. With the aim of inspecting its optical and electrical properties, a series of characterizations are carried on. This investigation revealed excellent optical proprieties such as an adequate bandgap, a short carriers' lifetime, and sensitivity to light. On the other hand, a Schottky diode behavior has been unveiled through electrical characterization by looking into the current-tension curves. Moreover, a hysteretic profile was discovered when the devices were scanned under forward and reverse voltage. The origin of the hysteresis shown in IV curves has been a subject of controversy. We here present an explanation based on our observations. These optical and electrical proprieties reveal the wide range of applications of our material whether in the optoelectronic or electronic field.



JDD2023 :8-9 Mai 2023

## A sensitive electrochemical sensor based on ZnO@SiO<sub>2</sub>-APTES for high detection of Pb (II) and Cd (II) ions in real samples

**Auteurs :** Dhaffouli afef <dhaffouliafef@gmail.com> (1) (2), Mabrouk chama <chamaelmabrouk@gmail.com> (1), Barhoumi houmine <houmine.barhoumi@fsm.rnu.tn> (1)

**Affiliations :** 1 - Laboratoire des interfaces et des matériaux avancés (LIMA) ( Tunisie), 2 - Department of chemistry, University of Gafsa, Faculty of Sciences of Gafsa, 2100 Gafsa, Tunisia ( Tunisie)

**Code :** 467751

**Commission :** chimie

**Salle :** 1

**Mots clés :** electrochemical sensors, Differential Pulse Voltammetry, Heavy Metal Detection, Nps ZnO@SiO<sub>2</sub>-APTES, SiO<sub>2</sub>-APTES

### **Abstract :**

In this work, a nanomaterial that undergoes first functionalization and then doping to improve the detection performance of heavy metals. We obtained these nanoparticles by modified Stöber methods using the sol-gel route due to its advantages in controlling the nanoparticle pores. We are working on silica nanoparticles a reason of they are characterized by having uniform porous when we did the functionalization at APTES and inserted an oxidized metal (ZnO) the external surfaces of mesoporous SiO<sub>2</sub> and the outer surface will be decorated. This method has been used to improve the detection performance of heavy metals. The electrochemical behavior of the composites was characterized by CV, DPV, and EIS. As a result, the fabricated sensor showed good sensitivity towards the target Pb (II) and Cd (II) ions. After optimization, the electrochemical sensor of ZnO@SiO<sub>2</sub>-APTES has shown excellent performance in the detection of Pb (II) and Cd (II). As a result, the modified electrode demonstrates good stability with high responses for different tested metal ions with a limit of detection of 2.5E-8M for Cd(II) and 2.5E-9 M for Pb (II). Finally, the proposed electrochemical sensor has been successfully applied to the determination of traces of metal ions in a real environment.



JDD2023 :8-9 Mai 2023

## Structure, propriétés optiques et analyse de Judd-Ofelt de $\text{Li}_3\text{Ba}_2\text{Gd}_3(\text{WO}_4)_8$ dopé à l' $\text{Eu}^{3+}$ pour des luminophores émettant un orange rougeâtre pour des applications WLED.

**Auteurs :** Douzi abir <abir.douzi1996@gmail.com> (1) (2), Slimi sami <samislami07@gmail.com> (2), Mateos xavier <xavier.mateos@urv.cat> (2), Ben Salem ezzedine <ezzedine.bensalem@ipeim.rnu.tn> (1)

**Affiliations :** 1 - I.P.E.I. de Monastir, Unité de recherche: Matériaux et Synthèse Organique (UR17ES31), Université de Monastir 5019, Tunisie. ( Tunisie), 2 - Universitat Rovira i Virgili (URV), Física i Cristal·lografia de Materials (FiCMA), Marcel·li Domingo 1, 43007, Tarragona, Espagne. ( Espagne)

**Code :** 468187

**Commission :** physique

**Salle :** 1

**Mots clés :** Tungstates, Ions d'euporium, Structure cristalline, Luminescence, Judd Ofelt, WLEDs.

### **Abstract :**

Des luminophores  $\text{Li}_3\text{Ba}_2\text{Gd}_{3-x}(\text{WO}_4)_8:\text{xEu}^{3+}$  orange rougeâtre ont été synthétisés par la méthode de réaction à l'état solide. Les luminophores ont cristallisé dans le système monoclinique. Les paramètres de la cellule unitaire sont  $a=5.214\text{\AA}$ ,  $b=12.744\text{\AA}$ ,  $c=19.205\text{\AA}$ ,  $\alpha=\gamma=90^\circ$  et  $\beta=91.931^\circ$ . Les spectres PL, les durées de vie, les coordonnées et la pureté de couleur, ainsi que les spectres d'émission dépendant de la température ont été étudiés. Après excitation à 395 nm, les luminophores ont montré une émission rouge avec un pic centré à 614 nm qui a été attribué à la transition dipolaire électrique  $5D_0 \rightarrow 7F_2$  des ions  $\text{Eu}^{3+}$ . La concentration optimale d'ions  $\text{Eu}^{3+}$  s'est avérée être  $x=3\text{at.}\%$ . La distance critique pour le transfert d'énergie a été calculée comme étant de 7,409 Å. Les valeurs du rapport d'asymétrie  $[(5D_0 \rightarrow 7F_2)/(5D_0 \rightarrow 7F_1)]$  ont révélé que les ions  $\text{Eu}^{3+}$  occupaient les sites cationiques déformés avec une position non centrosymétrique. L'efficacité quantique a montré la valeur la plus élevée pour  $\text{Li}_3\text{Ba}_2\text{Gd}_3(\text{WO}_4)_8:4\text{at.}\%\text{Eu}^{3+}$ . En outre, les coordonnées de couleur de  $\text{Li}_3\text{Ba}_2\text{Gd}_3(\text{WO}_4)_8:3\text{at.}\%\text{Eu}$  ont été définies comme (0.6302, 0.3648) et ont également montré une pureté de couleur (98.42%). Ils ont montré une bonne stabilité thermique avec une énergie d'activation de 0,428 eV. Ces résultats ont révélé que les luminophores  $\text{Li}_3\text{Ba}_2\text{Gd}_3(\text{WO}_4)_8:\text{Eu}^{3+}$  peuvent servir de luminophores potentiels émettant un orange rougeâtre pour les WLED pompées dans le proche d'UV.



JDD2023 :8-9 Mai 2023

---

## Development and Characterization of a Cement-based Material Reinforced with Lignocellulosic Fibers

**Auteurs :** Ben Chaabene khouloud <khouloudbenchaabene51@gmail.com> (1),  
Laajili marzouk <marzouk.lajili@ipeim.rnu.tn> (1)

**Affiliations :** 1 - Unité d'Étude des Milieux Ionisés et Réactifs [Monastir] ( Tunisie)

**Code :** 468654

**Commission :** chimie

**Salle :** 1

**Mots clés :** Construction materials, reinforced cement, lignocellulosic fibers, hydrophilic, hydrophobic

### **Abstract :**

The construction sector consumes huge amounts of non-renewable energy. The depletion of fossil resources, excessive carbon emissions and global warming are pushing researchers to develop a new generation of renewable and recyclable building materials with a low environmental impact. Therefore, the implementation of new construction materials is beneficial not only in terms of costs and energy, but also in terms of reducing the consumption of natural raw resources and the frequency of their extraction. Hence, alternative materials including natural fibers are renewable, recyclable and present excellent mechanical and thermo-hygrical properties. Moreover, these fibers could replace glass and carbon fibers in many fields of applications. Indeed, the natural fiber industry represents a booming economic sector given the benefits that these fibers could provide for several sectors of industry such as textile, automotive, building etc. Besides, thanks to their low extraction cost, the incorporation of these fibers as additives into different matrix materials makes them to be bio-economics, and ecologic with a low environmental footprint.



JDD2023 :8-9 Mai 2023

## Structural, morphological, optical and dielectric properties of sodium bismuth titanate ceramics

**Auteurs :** *Najah rhimi* <najahrhimi880@gmail.com> (1)

**Affiliations :** 1 - Faculté des sciences de Monastir ( Tunisie)

**Code :** 468696

**Commission :** physique

**Salle :** 1

**Mots clés :** Perovskite, X, ray, diffraction, Reflectance, Dielectric, Conductivity.

### **Abstract :**

This work focuses on the structural, optical and electrical properties of sodium bismuth titanate  $\text{Bi}_{1/2}\text{Na}_{1/2}\text{TiO}_3$  (NBT) lead-free ceramic for its possible application in capacitors, batteries and as an electrolyte in SOFC. X-ray diffraction analysis performed at room temperature revealed a rhombohedral structure. Scanning electron microscopy analysis revealed a polycrystalline nature of the material with a grain size of  $29.17 \mu\text{m}$ . The band gap energy was extracted through diffuse reflectance spectroscopy and was found to be 2.61 eV. Detailed studies of dielectric and impedance properties carried out in the frequency range of 40–107 Hz at different temperatures (from 400 K to 700 K) provided many interesting properties. The dielectric loss and dielectric constant with frequency increase. This behavior could be interpreted by the Maxwell–Wagner type of polarization in agreement with Koop's theory. The Ac-conductivity spectrum satisfied Jonscher's power law below 460 K and followed Jonscher's double power law (DPL) above 480 K. The correlated barrier hopping (CBH) and small polaron hopping (SPH) models could explain the conduction mechanism at the studied temperature range. The present work could give further insights into this kind of material from a physical point of view and thus enhance its presence in the industrial field.



JDD2023 :8-9 Mai 2023

## Elaboration and structural properties of Germanium thin-films grown on mesoporous Si buffer for III-V Integration

**Auteurs :** Saidi aicha <saidiaycha1994@gmail.com> (1), Tilouche samir <samirtilouche@gmail.com> (1), Imen zeydi <imenzeydi11@gmail.com> (1), Mohammed abdellaoui <medbouabdellaoui@gmail.com> (2), Berbezier isabelle <isabelle.berbezier@im2np.fr> (2), Sfaxi larbi <larbi.safaxi@yahoo.fr> (1), Mghaieth ridha <ridha.mghaieth123@gmail.com> (1)

**Affiliations :** 1 - Department of Micro Optoelectronic and Nanostructure, University of Monastir, Monastir, Tunisia ( Tunisie), 2 - Institut Matériaux Microélectronique Nanoscience de Provence, Aix-Marseille Université, UMR CNRS 6242, Avenue Escadrille Normandie Niemen - Case 142, 13997 Marseille, France. ( France)

**Code :** 468974

**Commission :** physique

**Salle :** 1

**Mots clés :** Porous structure, Molecular Beam Epitaxy, Incorporation, SiGe buffer layer.

### **Abstract :**

Owning to the small lattice and thermal expansion mismatch between germanium (Ge) and gallium arsenide (GaAs). Ge was an attractive material to monolithic integration of III-V semiconductors on silicon (Si). In this work, a full in-situ Molecular Beam Epitaxy method from Ge buffer films were elaborated on mesoporous structures (monolayer and multilayers). The influence of the substrate temperature, while germanium nucleation, with different thicknesses has been systematically studied. Scanning Electron microscopy (SEM) and Atomic force microscopy (AFM) showed that the surface morphology of germanium layer deposited at low temperature ( $< 160$  °C) leads to a smooth surface independently of the deposited thickness. The HR-XRD spectrum in  $\omega$ - $2\theta$  scan on (004) reflection demonstrate a conversion of strain type in structures with the growth heat. Moreover, it confirms the EDS outcomes which suggest the Ge incorporation inside the pores and the blending of Ge with Si crystallites. This intermixing results a SiGe composite which behave later as a compliant buffer layer and enhance more the GaAs layer quality.



JDD2023 :8-9 Mai 2023

---

## An investigation of structural, morphological and electrical conductivity of the multiferroic double perovskite

**Auteurs :** Meftah sana <meftahsana97@gmail.com> (1), Dhahri jemai <jemaidhahri@yahoo.fr> (1)

**Affiliations :** 1 - Faculté des sciences de Monastir ( Tunisie)

**Code :** 469055

**Commission :** physique

**Salle :** 1

**Mots clés :** double perovskite, Solid state method, structural, conductivity

### Abstract :

La<sub>2</sub>NiMnO<sub>6</sub> (LNMO) double perovskite have found wide applications in modern electronic devices such as capacitors, pyroelectric transducers and piezoelectric resonators. this work focuses on the structural, morphological and electric features of LNMO ceramics. LNMO were successfully synthesized by the solid-state method. X-ray diffraction study performed at room temperature revealed a monoclinic structure with P21/n space group. Rietveld refinement confirmed a good agreement between the calculated and the observed pattern. Scanning electron microscopy analysis revealed a polycrystalline nature of the material with a grain size of 1.25 $\mu$ m. Mapping and EDX analysis confirm the existence and the homogeneous distribution of elements on the surface of our samples. The conductivity spectrum satisfied Jonscher's power law. The Ac-conductivity spectrum indicating that conduction is provided by jumps correlated with a potential barrier (CBH) model. The study of the Dc-electrical conductivity confirmed that our compound followed the small polaron hopping (SPH) model in low temperatures.



JDD2023 :8-9 Mai 2023

## **A new electrochemical impedance sensor for detection of Al<sup>3+</sup> ions in water based on a new imidazole derivative**

**Auteurs :** Ramzi ramzi <ramzimeguebli@gmail.com> (1), Echabaane mosaab <mosabechabaane@gmail.com> (2), Ben Chaabane rafik <rafik.benchaabane@fsm.rnu.tn> (3), Baouab mohamed Hassen V. <hbaouab@yhoo.fr> (3)

**Affiliations :** 1 - Faculté des Sciences de Monastir ( Tunisie), 2 - Faculté des sciences de Monastir ( Tunisie), 3 - IPEM ( Tunisie)

**Code :** 469089

**Commission :** chimie

**Salle :** 1

**Mots clés :** sensor, electrochemical, based schiff

### **Abstract :**

Aluminum ions have a critical role in biological reactions in the human body. The toxic impact of uncontrolled consumption of aluminum-contaminated food or water demands a sensitive method for its determination. In this work, a novel electrochemical sensor based on the schiff molecule (IMI-BF) was developed for the determination of aluminum ions in water. The optical properties were processed by UV spectroscopy measurements, which showed the ability of THI to preferentially detect the aluminum ion by forming a complex (1:1) with a high stability constant. A THI-modified platinum electrode was developed and characterized using impedance electrochemical spectroscopy (EIS) with the ultimate goal of performing the analytical determination of aluminum ions in water. Under optimal conditions, the developed sensor exhibits a linear range of 1 nM to 10 mM and a detection limit of the order of 8.17 with good repeatability. The platinum/imidazole sensor demonstrates high sensitivity and selectivity for aluminum ions over some common interference ions. The real test to detect aluminum in water showed a relative signal change of less than 5%, which indicates the high quality of our sensor.





JDD2023 :8-9 Mai 2023

---

## dielectric properties and NTCR behavior of BaFe<sub>1/2</sub>Nb<sub>1/2</sub>O<sub>3</sub> ceramic over a broad temperature range

**Auteurs :** Amara manel <maneamara4@gmail.com> (1), Dhahri jemai <jemaidhahri@yahoo.fr> (1)

**Affiliations :** 1 - Faculté des Sciences de Monastir ( Tunisie)

**Code :** 469102

**Commission :** physique

**Salle :** 1

**Mots clés :** BaFe<sub>1/2</sub>Nb<sub>1/2</sub>O<sub>3</sub> / Dielectric / conductivity / lead, free perovskite

### Abstract :

The barium iron niobate material BaFe<sub>1/2</sub>Nb<sub>1/2</sub>O<sub>3</sub> (BFN) was prepared using the solid-state reaction route. At room temperature, the Rietveld refinement technique showed a cubic phase with the space group Pm 3m. In the low temperature range, the conductivity (versus frequency) followed the double power law. An appropriate model is used to obtain the electrical parameters related to such relaxations. The BFN ceramic showed two dielectric relaxations in the temperature ranges 170–325 K and 400–520 K. Most interestingly, a high permittivity value is obtained with a low dielectric loss (0.14) at room temperature. To better understand the physical mechanisms of these materials, we used a model based on the combined effect of polarons and conductive charge carriers. The importance of this study lies in its ability to distinguish the contributions of localized and conductive charge carriers, also explaining the permittivity plateau near room temperature.



JDD2023 :8-9 Mai 2023

---

## New Cyanato-N Cadmium(II) Meso-arylporphyrin Complex: Spectroscopic Characterization, Electrical Conductance and Dielectric Properties

**Auteurs :** Dardouri nour Elhouda <nourelhoudadardouri@gmail.com> (1)

**Affiliations :** 1 - Faculté des sciences Monastir ( Tunisie)

**Code :** 469255

**Commission :** physique

**Salle :** 1

**Mots clés :** Cadmium(II) porphyrin complex, UV/Vis spectroscop, Electrical conductance and dielectric properties.

### Abstract :

Herein, we have presented a new cadmium(II) pentacoordinate porphyrin complex. (symbolized by complex I). Compound I was prepared by the reaction of the [Cd(TMPP)] starting material with an excess of potassium cyanate salt and an excess of the cryptand-222 in dichloromethane. This complex was characterized by UV-visible, IR and proton NMR spectroscopy. Furthermore, the electrical conductance and dielectric properties of complex I were investigated shown firstly that the frequency dependence of electrical conductivity, follows the Jonscher's universal dynamic law and secondly that the obtained results have been discussed in terms of the OLPT and NSPT models, which is well adapted to our Cd(II)-porphyrin-NCO semiconductor material.



JDD2023 :8-9 Mai 2023

## Synthesis and characterization of structural , dielectric properties of double perovskite

**Auteurs :** Homri amal <amalthomri1998@gmail.com> (1), Dhahri jemai <jemaidhahri@yahoo.fr>

**Affiliations :** 1 - Faculté des sciences de Monastir ( Tunisie)

**Code :** 469288

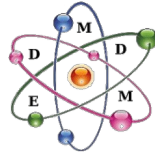
**Commission :** physique

**Salle :** 1

**Mots clés :** Perovskite, structural, sol, gel, dielectric, solide, constance

### Abstract :

Abstract The double perovskite structure is interesting for many researches in various fields of physics .Double perovskite  $\text{SrLaFe}_{0.5}\text{Ni}_{0.5}\text{MoO}_6$  (SLFNMO) compound is a very important for many technologies because it has dielectric and electrical properties. It has made an attractive semiconductor material for the electronic field, such as the realization of capacitors powder was synthesized by so-gel process . Their structural, dielectric, properties were comprehensively investigated It was found that the SLFNMRO powders possessed a tetragonal crystal structure with  $I4/m$  space group and exhibited spherical shapes . Quantitative energy dispersive X-ray spectrometer data revealed the atomic ratio of Sr, Fe, Re, and O elements close to the nominal values of 2:1:1:6 .Dielectric property measurements revealed a Maxwell–Wagner type dielectric dispersion in the SLFNMO ceramics. Impedance spectroscopy has been applied to explore electrical properties The Nyquist plots for ALT reveals the rising dominance of the grain boundary contribution to the conduction process with increasing temperature. The complex modulus plots confirm the presence of both the grain and grain boundary contributions to the relaxation process at low temperatures. The relaxation mechanism is seen to be shifted from its ideal character as observed in the Nyquist plots. The frequency dependent conductivity spectra follow the power law behavior.



JDD2023 :8-9 Mai 2023

## Structural, morphological and optical analysis of Nd-doped Bismuth Ferrite

**Auteurs :** Chiba ilhem <chiba.ilhem@etudiant-fst.utm.tn> (1), Moneim zannen <moneimchimie2006@yahoo.fr> (2), Cécile autret <Autret@univ-tours.fr> (3), Fredj hassen <hassenfredj@gmail.com> (1), Ridha mghaieth <ridha.mghaieth123@gmail.com> (1)

**Affiliations :** 1 - Laboratoire de Micro-Optoélectronique et Nanostructures (LMON) ( Tunisie), 2 - Laboratoire d'interfaces et de matériaux avancés (LIMA) ( Tunisie), 3 - GREMAN (Université de Tours) ( France)

**Code :** 469318

**Commission :** physique

**Salle :** 1

**Mots clés :** Bismuth ferrite, Multiferroic, Nanoparticles, Neodymium doping, Sol, gel method, X, ray diffraction (XRD), FESEM, Raman spectroscopy, Photoluminescence

### **Abstract :**

Neodymium doped bismuth ferrite nanoparticles were successfully synthesized by a facile sol-gel route. X-ray diffraction analysis shows distorted rhombohedral perovskite structure where the average crystallite size in these samples are calculated using Scherrer's method and Williamson-Hall equation, respectively. The Rietveld refinement revealed the rhombohedral crystal structure with  $R3c$  space group and devoid of impurity phases. In addition, morphological study has been carried out using FESEM analysis and shows the formation of clear grain nanoparticles of average size  $0.23 \mu\text{m}$ . The Raman analysis shows the presence of the 13 Raman modes confirming the stability of the Nd doped bismuth ferrite. In order to explore the optical properties of Nd doped  $\text{BiFeO}_3$  nanoparticles, their photoluminescent properties were also investigated.



JDD2023 :8-9 Mai 2023

## Synthesis and characterization of a novel strontium-yttrium phosphate with a Whitlockite-like structure.

**Auteurs :** Mokni ines <moknines1996@gmail.com> (1), Badri abdessalem <badri\_abdessalem@yahoo.fr>, Ayed brahim <ayedbrahim@yahoo.com>

**Affiliations :** 1 - Faculté des sciences Monastir ( Tunisie)

**Code :** 469359

**Commission :** physique

**Salle :** 1

**Mots clés :** strontium phosphates, whitlockite type structure, optical properties

### Abstract :

The Whitlockite family has been widely studied owing to their structural complexity resulting from their lacunar structure and the numerous ways of possible cationic substitution. Indeed, several physical properties have been elucidated, in particular optical properties. The present work focuses on the study of a new strontium-yttrium phosphate (SYP) based material with a structure similar to that of Whitlockite. The material was prepared through a solid state method. The material has been characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) incorporating energy dispersive X-ray (EDX) analysis, Fourier transform infrared (FTIR) spectroscopy, Raman spectroscopy and optical spectroscopy. XRD analysis of SYP confirmed the purity of SYP from the Bail refinement. SYP crystallizes in the monoclinic system of space group  $I 2/a$  where the lattice constants are  $a=18.08934 \text{ \AA}$ ;  $b=10.69304 \text{ \AA}$ ;  $c=18.49781 \text{ \AA}$ ;  $\beta=132.95221^\circ$ . SEM-EDX analysis showed spherical grain morphology and the EDX confirmed the chemical compositions in agreement with the the chemical formula. FTIR and Raman spectroscopies revealed the presence of the various vibrational modes of  $PO_4$  groups. Diffuse Reflectance Spectroscopy (DRS) showed an indirect band gap of 3.63 eV.



JDD2023 :8-9 Mai 2023

---

## Highly stable temporally $\delta$ -Bi<sub>2</sub>O<sub>3</sub> prepared on GaAs by thermal oxidation of bismuth thin films

**Auteurs :** Ben Abdelwahed amira <amirabenabdelwahed1@gmail.com> (1), Fitouri hédi <hedi.fitouri@fsm.rnu.tn> (1), Rebey ahmed <ahmed.rebey@fsm.rnu.tn> (2)

**Affiliations :** 1 - Faculté des Sciences de Monastir ( Tunisie), 2 - Qassim University [Kingdom of Saudi Arabia] ( Arabie saoudite)

**Code :** 469413

**Commission :** physique

**Salle :** 1

**Mots clés :** bismuth, oxidation, thin films, annealing, microcrystalline, UV, VIS spectroscopy, SEM, XRD, Reflectance

### **Abstract :**

Bismuth thin films were prepared by ultrahigh vacuum evaporation method. These films were characterized by High Resolution X-Ray Diffraction and scanning electron microscopy. In order to obtain bismuth oxide, the as-obtained bismuth films were thermally treated at 300 °C during 1h30 min. The thermally treated samples were studied by High Resolution X-Ray Diffraction. Additionally, information on the optical property and morphology was obtained by spectroscopic ellipsometer, spectral reflectance and scanning electron microscopy, respectively. Results show that bismuth films were oxidized and transformed into the  $\delta$ -Bi<sub>2</sub>O<sub>3</sub> phase. The temporal stability of the  $\delta$ -Bi<sub>2</sub>O<sub>3</sub> was confirmed by XRD measurements on samples preserved for 1 year under the atmosphere without special precautions.



JDD2023 :8-9 Mai 2023

---

## Synthesis using layer by layer method and characterization of nanostructured MOF thin film

**Auteurs :** Achech amel <achech@outlook.fr> (1), Haj Said ayoub <ahajsad@gmail.com> (2)

**Affiliations :** 1 - Laboratoire des Interfaces et Matériaux Avancés ( Tunisie), 2 - Research Center for Microelectronics and Nanotechnologies Technopole ( Tunisie)

**Code :** 469472

**Commission :** physique

**Salle :** 1

**Mots clés :** MOFs, thin film, ZIF8

### **Abstract :**

The modification of surfaces and interfaces by assembling porous materials is a topic of pronounced technological importance because this approach paves the way for crystals with potential applications such as chemical sensors, gas storage and separation, chemical sensing, and catalysis [1]. In particular, Metal-Organic Frameworks (MOFs) are a reassuring class of porous materials resulting from the reaction between inorganic and organic species. In fact, several ways to deposit thin films of MOFs have been reported [2]. Layer by layer deposition is one of the most powerful techniques. The basis of this method is that the reaction components are combined in a sequential manner. A distinct advantage of this growth mode is that it provides homogeneous, highly crystalline MOFs films. In this study, we report the elaboration of Zeolitic Imidazolate Framework-8 (ZIF-8), a representative MOFs Material. The investigation of the Zn/Hmim molar ratio reveals that the ZIF-8 particle size decreased and the fractal dimension consequently increased when the amount of linker increased. The structural and morphological studies of ZIF-8 were characterized using ATR-FTIR(IR) Fourier, X-ray diffraction (XRD), and optical and scanning electron microscopy.



JDD2023 :8-9 Mai 2023

---

## Facile Deposition of pyrazole Metal-Organic Framework Thin Films

**Auteurs :** Toumia hiba <hiba095toumia@gmail.com> (1), Zrida habiba <zridahabiba@gmail.com>, Haj Said ayoub <ahajsad@gmail.com>

**Affiliations :** 1 - Laboratoire des Interfaces et des Matériaux Avancés ( Tunisie)

**Code :** 469557

**Commission :** physique

**Salle :** 1

**Mots clés :** MOF, naphthalene diimide, pyrazole, Coordination polymers, nanoporous material

### **Abstract :**

Recently, self-assembled coordination polymers, namely crystalline, microporous metal-organic frameworks (MOFs), have received considerable attention for their potential in several applications, including electronic devices [1]. Some of these applications require the elaboration of MOFs in the form of thin films. The aim of this work is to develop a method for preparing a thin film of MOFs based on a conversion reaction of metal hydroxide followed by a secondary growth step. The conversion has been tested with a pyrazole ligand [2], and deposited by simple immersion of a glass slide. The IR characterization showed that this method is efficient to produce thin films of MOFs on a glass substrate. Moreover, the observation by optical microscope revealed that the experimental conditions have an important influence on the geometry of the obtained structures as well as on the coverage rate of the substrate surface.





JDD2023 :8-9 Mai 2023

## Electrical and dielectric behaviors for $\text{Cu}_{0.6}\text{Mg}_{0.2}\text{Co}_{0.2}\text{FeCrO}_4$ spinel ferrite synthesized by sol–gel route at $850^\circ\text{C}$

**Auteurs :** Jdidi abd Raouf <j.abdrraouf@gmail.com> (1), Bouazizi hadda <bouazizihadd@gmail.com> (2), Sobhi hcini <hcini\_sobhi@yahoo.fr> (3), Bouazizi abdelaziz <abdelaziz.bouazizi@yahoo.fr> (1), Gassoumi malek <malek.gassoumi@gmail.com> (1)

**Affiliations :** 1 - Laboratory of Condensed Matter and Nanosciences, University of Monastir, Monastir 5000, Tunisia ( Tunisie), 2 - Unit of Research of Advanced Materials and Nanotechnologies (URAMN), Higher Institute of Applied Sciences and Technology of Kasserine, University of Kairouan, BP 471, Tunisia. ( Tunisie), 3 - Faculty of Sciences and Technology of Sidi-Bouزيد, University Campus Agricultural City, University of Kairouan, 9100 Sidi Bouزيد, Tunisia. ( Tunisie)

**Code :** 469608

**Commission :** physique

**Salle :** 1

**Mots clés :** Ferrites . Solgel method . Electric properties, conductivity . Dielectric properties

### **Abstract :**

In this work,  $\text{Cu}_{0.6}\text{Mg}_{0.2}\text{Co}_{0.2}\text{FeCrO}_4$  ferrite samples were synthesized by sol–gel method at  $850^\circ\text{C}$ . The electrical and dielectric properties for  $\text{Cu}_{0.6}\text{Mg}_{0.2}\text{Co}_{0.2}\text{FeCrO}_4$  ferrite prepared by sol–gel process were investigated. The Nyquist plots are well modeled by an equivalent electrical circuit made up of a combination of grain and grain boundary elements. The behavior of dielectric constants has been interpreted based on the Maxwell–Wagner's theory of interfacial polarization. Electrical properties show that the sample exhibits higher electrical resistivity. The non-overlapping small polaron tunneling and the correlated barrier hopping are the suitable models to describe the conduction process for the sample. The conductivity spectra do not follow both Ghosh scaling and Summerfield scaling. The random barrier model (RBM) is applied to correct the Summerfield scaling. According to this model, the conductivity isotherms for the  $\text{Cu}_{0.6}\text{Mg}_{0.2}\text{Co}_{0.2}\text{FeCrO}_4$  ferrite are almost merged into a common curve with negative values of the scaling parameter  $a$ . This indicates that the conductivity comes from non-interacting particles. The behaviors of imaginary parts of impedance ( $Z''$ ) and modulus ( $M''$ ) show dielectric-relaxation phenomenon in the sample with activation energies near to those determined from the conductivity study. Address correspondence to E-mail: malek.gassoumi@gmail.com



*JDD2023 :8-9 Mai 2023*

---



JDD2023 :8-9 Mai 2023

---

## Effect of ion-exchange conditions on TL glow curves for copper doped glasses irradiated by gamma rays

**Auteurs :** Toumi safa <stoumi097@gmail.com> (1), Farah khaled <kafarah@gmail.com>

**Affiliations :** 1 - Laboratoire de Physico-Chimie des Matériaux, Département de Physique, Faculté des Sciences de Monastir, 5019 Monastir, Université de Monastir, Tunisia ( Tunisie)

**Code :** 471724

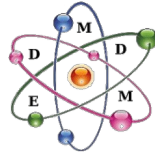
**Commission :** physique

**Salle :** 1

**Mots clés :** Cu, Na ion, exchange, Silicate glass, Thermoluminescence, Gamma irradiation, Electron paramagnetic resonance

### **Abstract :**

Silicate glasses have been studied by thermoluminescence to evaluate their potential as a gamma-sensitive material for the possible dosimetric application. We investigated the effect of different copper doping conditions, on its thermoluminescent (TL) sensitivity over a large dose range; from 10 mGy up to 100 kGy. The results showed that doping with copper greatly improved the sensitivity of the glasses to gamma radiation. We also tried to explain the origin of the observed thermoluminescence by exploiting the EPR spectra. Results have shown an TL concentration quenching which was due to the presence of larger concentration of copper and short duration of ion exchange.



JDD2023 :8-9 Mai 2023

## Optimization of the Nonlinear Optical Properties in lens-shaped $\text{In}_x\text{Ga}_{1-x}\text{As}/\text{GaAs}$ quantum dots under indium segregation and In/Ga inter-diffusion effects

**Auteurs :** Nabil ben Zerooug <mohchou@yahoo.fr>, Choubani mohsen <mohsenchoubani3@yahoo.fr> (1)

**Affiliations :** 1 - Mohsen Choubani ( Tunisie)

**Code :** 471736

**Commission :** physique

**Salle :** 1

**Mots clés :** quantum dots, nonlinear optical properties, Three dimensional Schrödinger equation, Finite Difference Method

### **Abstract :**

In this work, we theoretically studied the linear and nonlinear optical properties of the lens-shaped  $\text{In}_x\text{Ga}_{1-x}\text{As}/\text{GaAs}$  quantum dot under combined effects of Indium segregation, In/Ga inter-diffusion, strain, pressure, temperature, electric field, and QD morphology. Indium segregation inside the wetting layer is modeled by the Muraki model; however, atoms inter-diffusion inside the QD by a Gaussian function. Transition energies are calculated by solving the three-dimensional Schrödinger equation using the Finite Difference Method (FDM) method. In addition, the combined effects mentioned above are crucial to correlate the theoretical computations to experimental Photo-luminescence (PL) data. It is found that indium segregation causes a blue shift in the absorption or emission spectra. However, the intermixing effect causes a shift to lower energy. Although, the spectra experience a red or a blue dress depending on the applied electric field orientation and intensity. In addition, under the increase of the pressure (temperature), the spectra reveal a blue (a red) shift with a decrease (an increase) in magnitude. Hence, obtained results would be helpful as literature for controlling and adjusting the nonlinear optical properties of optoelectronic devices.