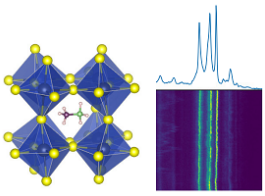
GEMaC

Groupe d'Étude de la Matière Condensée

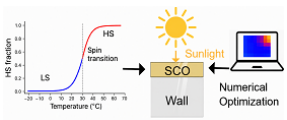
# HIGHLIGHTS



**Ultrasharp light signatures to probe defects in promising new optoelectronic materials**

November 9, 2026

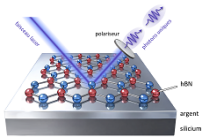
By studying single crystals of a halide perovskite — an emerging family of materials — at very low temperature, scientists at GEMaC have isolated ultrasharp luminescence lines associated with defects in the crystal. Two recent studies, published in The Journal of Physical Chemistry Letters in collaboration with the LuMIn and FOTON laboratories, show that these defects are collectively sensitive to fluctuations of the crystal lattice and that their emission is strongly polarized.




**Innovative materials for cooler, more energy-efficient buildings**

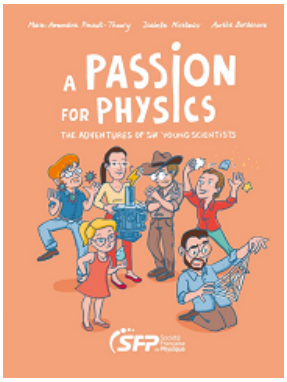
August 28, 2026

As part of a CNRS IEA (International Emerging Action) project, researchers from GEMaC, in collaboration with researchers from Sorbonne University in Abu Dhabi, have developed a novel numerical model to design smart coatings based on spin-transition materials, capable of naturally regulating the temperature of buildings. This breakthrough paves the way for façades that limit overheating in summer and reduce the need for air conditioning.



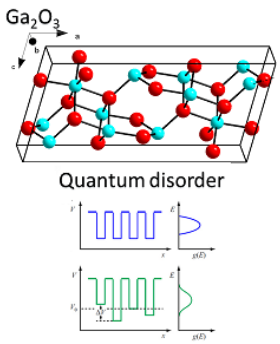

**Generation of indistinguishable photons via resonant laser control of defects in a 2D material**
February 23, 2026

Physicists have controlled the quantum state of an artificially created crystal defect using a resonant laser. This approach enabled them to generate indistinguishable photons, the building blocks of quantum optical information. This work was featured in a CNRS Physics highlight.



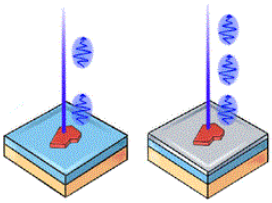

**The comic book ‘A Passion for Physics’, co-written by GEMaC researcher Marie-Amandine Pinault-Thaury, is now available in English!**
July 16, 2025

The Société Française de Physique's comic book, published in 2023 to mark its 150th anniversary, is now available in English. The book was co-written by Marie-Amandine Pinault-Thaury (CNRS researcher at GEMaC), Isabelle Mirebeau (CNRS researcher at LLB) and Aurélie Bordenave (scientific cartoonist).



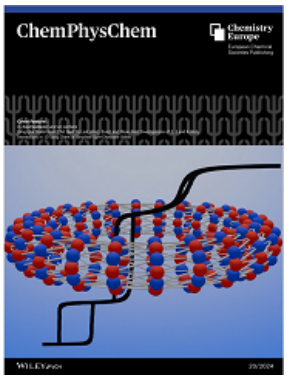

**Pushing the Boundaries of GaO Technology for Energy and Power Electronics through Quantum Disorder**
June 3, 2025

A new study shows that, through phosphorus doping of -GaO, an exceptional p-type conductivity is obtained at room temperature, as well as a metal-insulator transition. These results open avenues for improving power electronics, essential to power grids and transport systems, and contributes to wider adoption of renewable energies.



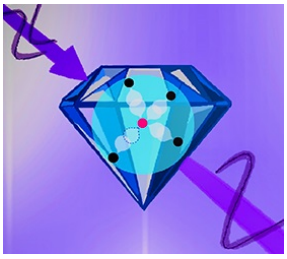
**Efficient, bright single-photon emitters thanks to a silver mirror**
March 11, 2025

Researchers at GEMaC have coupled a nanometric layer of silver with a 2D material to unlock the secrets of the single-photon sources they have created in this crystal.



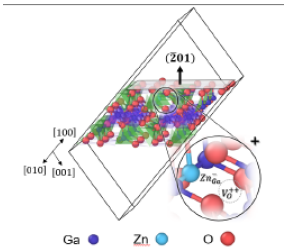

**Decoding the Mysteries of Spin-Crossover Materials: A Model to Explore Complex Phenomena**
October 23, 2024

Researchers have developed a model inspired by the Ising model to explain a wide range of fascinating behaviours observed in certain spin-crossover materials. Their work made the cover of ChemPhysChem.



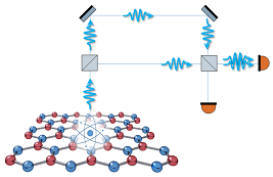
**Blue diamonds to understand spin-orbit interaction**
April 11, 2024

Very high resolution optical absorption measurements have made it possible to understand the light spectrum of boron-doped synthetic diamond, as part of an international collaboration between GEMaC and Kyoto University (Japan).



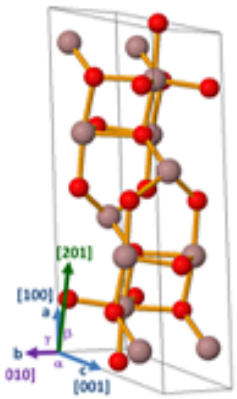

**Native “imperfections” enables room-temperature p-type conductivity in -Ga2O3**
November 23, 2023

Researchers from GEMaC have demonstrated an important step for the realization of power electronics devices.



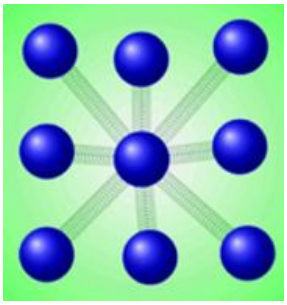
**Coherent photons in two dimensions**
August 25, 2023

Researchers at GEMaC have published two complementary studies demonstrating that single photons emitted by a two-dimensional material are coherent, a property that is essential for applications in quantum computing. This work was the subject of an INP highlight.



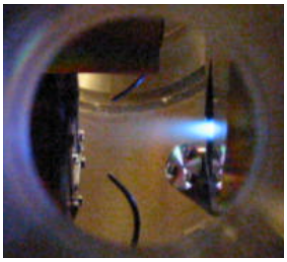

**Gallium oxide pushes the limits of silicon for power electronics**
May 25, 2022

Editor’s Choice and one of the most downloaded papers of the ‘Materials’ (MDPI) journal in the first five months of the year, this review discusses the application of ultra-wide bandgap semiconductors in power electronic devices, focusing in particular on gallium oxide.



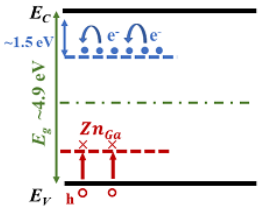
**A new theoretical approach reveals the emergence of complex self-organised structures in spin crossover materials**
January 31, 2022

Researchers from GEMaC laboratory have developed an effective electro-elastic model to simulate phase transitions in spin crossover crystals. The resolution of this model is 50 times faster than the traditionally used model, which has allowed them to reveal a wide variety of complex phenomena.



**A series of discoveries about the incredible conductive and transparent materials known as vanadates.**
November 14, 2021

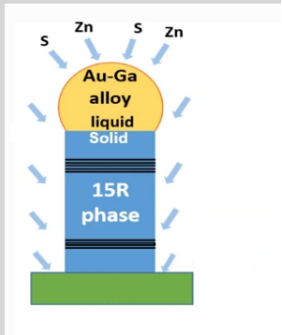
Strontium and calcium vanadates (SrVO3 and CaVO3) are perovskite oxides. They are materials with multiple potential functions and applications. Here is an overview of recent advances, to which GEMaC has made a major contribution.



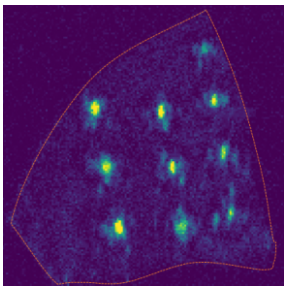

**A material conducts to a bright future**
September 17, 2021

GEMaC researchers show how the conductivity of the spinel material ZnGa2O4 can be controlled over a very wide range, opening up applications in ultra-high power electronics and deep ultraviolet optoelectronics.

**A new crystal phase in semiconductor nanowires**
June 25, 2021

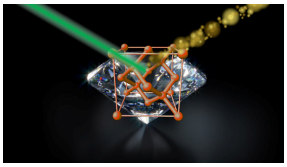



GEMaC researchers, in partnership with the LEM (CNRS-Onera), have produced and characterised an original and unexpected crystal structure in nanoscale zinc sulphide (ZnS) wires.



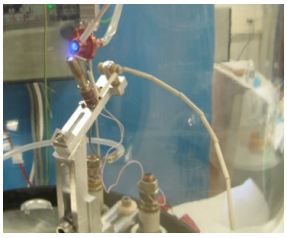
**Controlled positioning of quantum light sources in a 2D material**
June 18, 2021

By exciting a two-dimensional material with an electron microscope beam, our researchers and their collaborators have uncovered new sources of single photons in crystalline materials.



**An Equipex project on diamond for quantum applications**
May 31, 2021

At UVSQ, the GEMaC laboratory is contributing its expertise on the growth and characterisation of diamonds by cathodoluminescence to the e-Diamant project.



**From the GEMaC laboratory to space: a 20-year history of innovative thrusters for miniature satellites**
February 3, 2021

A look back at the incredible story of the Petit Propulseur Innovant (PPI) and its successor the µ-PPI, whose prototypes were invented, designed and built at GEMaC.



**GEMaC welcomes two new colleagues!**
December 1, 2020

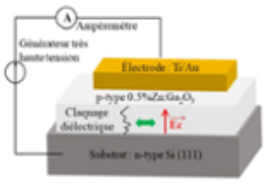
We would like to welcome two new GEMaC members hired by UVSQ, Jean-Michel Chauveau (Professor) and Sébastien Colinot (Assistant Engineer).

**MOSTRA project involving GEMaC receives funding from Île-de-France region**



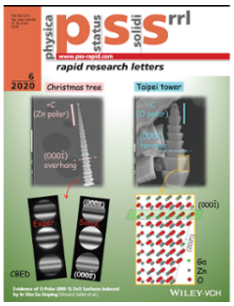
November 27, 2020

This project is focused on the new generation transmission electron microscope and involves several laboratories in Île-de-France region, including GEMaC. It will be funded via SESAME 2020 program.




**Critical electric field record for gallium oxide**
November 2, 2020

Increasing the voltage and avoiding breakdown of materials used in power electronics remain a current challenge. The researchers broke a record for the critical electric field with a value of 13.2 MV /cm. This result has been selected as "News from Physics Institute" of CNRS.




**Crystal facet engineering: Christmas tree or Taipei tower-like nanostructures**
July 3, 2020

The work of GEMaC researchers and engineers is on the cover of Physica Status Solidi RRL of June.



**GEMaC embarks with Flagship Graphene to Core 3**
May 28, 2020

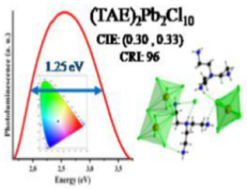
Flagship Graphene announced a transition to Core 3, the fourth funding round of the €1 billion research initiative funded by the European Commission.



**Covid19: GEMaC maintains its activities during UVSQ shutdown**
May 5, 2020

During the health crisis linked to the Covid19 pandemic, UVSQ along with other French universities had to close its doors on March 16, 2020. Nevertheless, the activities of the GEMaC continued unabated.

**A stable white light source for modern lighting and displays**



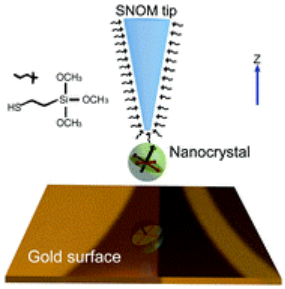

March 19, 2020

French and Tunisian researchers evidence and explain very broadband white light emission that is comparable to the reference white light.

**New website for GEMaC**

March 2, 2020

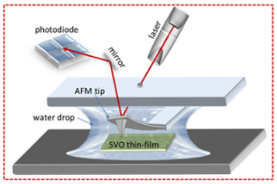
New, up-to-date and adjustable design suitable for all screen types (computer, tablet, mobile phone) as well as a updated structure based on targeted and accessible content.




**A single nanocrystal maps confined light at the nanometer scale**

February 28, 2020

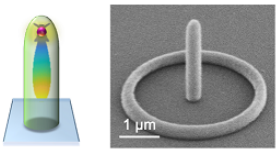
The plasmonic properties of a nanohole array probed by a single nanocrystal grafted at the tip of an optical near-field probe: this work by GEMaC researchers was published in the journal Nanophotonics in February 2020.




**A promising way of the integration of single crystalline oxides in electronic devices**

January 23, 2020

GEMaC and ILV researchers and engineers demonstrate a simple and promising way to transfer epitaxial oxide layers onto silicon

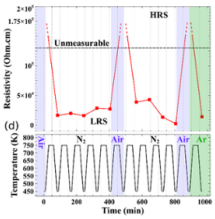



**A polymer antenna for the realisation of a bright and directional single photon source**

November 4, 2019

Researchers from GEMaC and LPQM (ENS Paris-Saclay) have developed a photonic cavity incorporating a light nanoemitter for efficient quantum light emission.

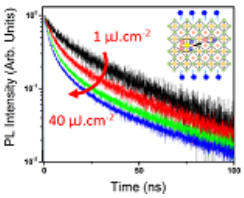
**Additional functionality in a material with a thousand applications**




September 11, 2019

Bismuth iron garnet, a material with already remarkable properties, becomes conductive with adjustable resistivity.

---

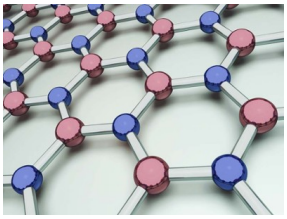



**A better understanding of optical properties of hybrid perovskites for photovoltaics and light emission**

August 15, 2019

Researchers from GEMaC and LuMIn labs unveil charge recombination dynamics in 2D hybrid perovskites, a promising new class of semiconductor materials.

---

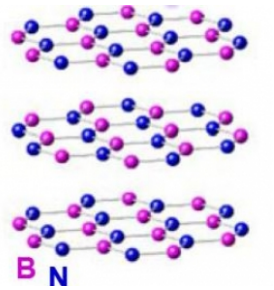


**GEMaC joins the European Graphene Flagship**

May 1, 2019

The University of Versailles St-Quentin-en-Yvelines joined the European Graphene Flagship research consortium.

---

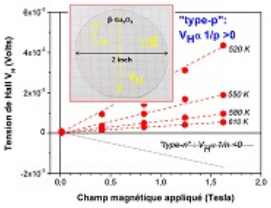



**Hexagonal boron nitride, a crystal with astonishing ultraviolet light**

April 25, 2019

Hexagonal boron nitride (hBN) emits ultraviolet light with an unusually high intensity for an indirect semiconductor. This apparent contradiction was finally explained by the particular nature of the excitons, revealed both by quantitative measurements and by their modelling.

---

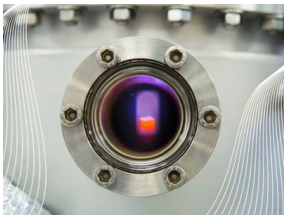



**A promising material for power electronics and optoelectronics in the ultraviolet range**

April 25, 2018

For the first time, researchers have succeeded in manufacturing large-diameter substrates of both "n" and "p" type -Ga2O3 semiconductors, making it possible to envision the development of components for both power electronics and optoelectronics in the far ultraviolet.

---



**GEMaC inauguration**
November 13, 2017

On November 13th, our laboratory inaugurated all its facilities, which are now fully operational. We had the pleasure of receiving more than fifty guests including our partners, colleagues and external collaborators.

## NEWS IN BRIEF

**01/10/2026**
Welcome to the new members:
**Shayna NEPAUL**, PhD Student (axis 3)
**Nolwenn TREMODEUX**, PhD Student (axis 1)

**19/06/2026**
GEMaC has welcomed the consortium of the EquipEx+ e-DIAMANT for their annual meeting, more information here.

**23/04/2026**
The project GOTEN, co-coordinated by Ekaterine Chikoidze from GEMaC, mentioned in an article from the journal Usine Nouvelle.

**16/04/2026**
Welcome to the new members:
**Elie Junior POUTOUGNIGNI**, master student (axe 1)
**Stéphane NANKO SIKAM**, master student (axe 2)
**Raïssa Darelle Nanfack**, master student (axe 3)
**Marine Clavel**, master student (axe 1)

**07/04/2026**
Welcome to the new members:

**Debora KEUGONGO**, master student (axis 1)
**Thimothée METEAU**, BUT student (axis 2)
**Jesús Gómez Sanchez**, master student (axis 3)

**23/10/2025**
Welcome to the new members:
**Mohammad ABUAYYASH**, PhD Student (Axis 1)
**Djordje DOSENOVIC**, post-doc (Axis 1)
**Ayoub GUALOUS**, PhD Student (Axis 3)
**Tien Thanh NGUYEN**, PhD Student (Axis 3)

**09/07/2025**
Welcome to the new members:
**Georges Guy NDAMKOU YONKEU**, PhD student (Axis 1)
**Akash PATNAIK**, Engineer (Axis 2)
**Thomas RIBAULT**, PhD student (Axis 2)

**11/06/2025**
Congratulations to Rosinel Alfonzo, PhD student at ILV and GEMaC, for her best poster prize at JNSPE 2025!
Highlights here

**24/04/2025**
Welcome to the new members:
Mohammad Abbuayyash, master student (axis 1)
Asmaa El Kihel, master student (axis 1)
Mathilde Coralie, master student (axis 2)
Antoine Sarge, master student (axis 1)

Aziz Gaci, bachelor student (axis 1)
Romain Lesur, bachelor student (axis 1)
Alexandre Maruchenko, bachelor student L3 (axis 1)
Jean-Baptiste Serinet, bachelor student (axis 3)
Joss Neyraud, bachelor student (axis 2)

**31/03/2025**
GEMaC researchers are involved in the European Safepower project.
Press release - https://www.safepowerproject.eu

**1/10/2024**
Welcome to the new members :
**Sahar GADDOUR**, PhD student (axe 1)
**Andrés NUÑEZ MARCOS**, PhD student (axe 3)
**Longhe LI**, PhD student (axe 2)
**Mouhamadou Sy**, visitor (axe 2)

**08/03/2024**
A video portrait of Marie-Amandine Pinault-Thaury, researcher at GEMaC lab !

**31/01/2024**
Welcome to **Vincent Polewczyk**, new CNRS researcher in GEMaC (axis 2)!

**17/01/2024**
Welcome to **Park Serim**, visitor student from Séoul (axis 1).

**17/11/2023**
Welcome to the new members:
**Helmi FARTAS** - PhD student
**Hien PHAN -** PhD student
**Estelle LOIRE** - CNRS engineer

**1/09/2023**
Welcome to the new members:
**Valérie Le Berre** (Administration)
**Hanadi Mehdi** (ATER)
as well as to visitors:
Fabiola Bravo Hualpa
Erick Serquen Infante
Mouhamadou Sy

**1/04/2023**
Welcome to our new master students:
Barbara Belza (axe 1)
Assane Gueyer (axe 2)
Helmi Fartas (axe 3)
Thi Hien Phan (axe 3)

**1/01/2023**
Welcome to Moussa MEBARKI (PhD student)

**10/10/2022**
GEMaC in the news:
- a portrait of Jean-Pierre Hermier, professor of quantum nanophotonics and vice director of GEMaC,
- a column on quantum computer by Aymeric Delteil on the occasion of the Nobel Prize of Alain Aspect

**3/10/2022**
Welcome to **Domitille Gérard**, PhD student (team OEN)

**30/05/2022**
Welcome to **Lilay Gros Desormeaux**, master student (team OEN)

**9/05/2022**
Welcome to **Océane Capelle**,master student (team OEN)

**11/04/2022**
Welcome to the new members:
**Élysé LAURENT**, master student (team DIAM)
**Mohamed Amine M'TIR**, master student (team P2MC)

**25/03/2022**
Welcome to **Théotime Bergèse**, master student (team OEN)

**10/03/2022**
Welcome to the new members:
**Soroush Alain ABBASI ZARGALEH**, post-doc (FOX)
**Ndiaga CISSE**, master student (M2, P2MC)
**Hamid NEGGAZ**, master student (M2, FOX)

**21/02/2022**
Welcome to **Julien GARCIA and Nouhaila AKHYAR**, master students (NSP)

**01/02/2022**

Welcome to **Alban Degezelle**, master student (team NSP)

**12/10/2021**
Congratulations Sumit Kumar for your Graduate student award at EMRS fall meeting 2021!

**5/10/2021**
Congratulations Étienne Carré for your PhD award ONERA 2021 "Matérials and Structures"!

**01/10/2021**
Welcome to the new members:
**Ibtissem Benguettat,** ATER (teamFOX) ;
**Thi Trang Nguyen**, PhD student (team OEN) ;
**Joanna Urban**, postdoc (ENS Paris-Saclay)
**Hugo Levy-Falk**, postdoc (ENS Paris-Saclay)

**15/07/2021**
Three projects of which GEMaC is coordinator or partner, have been accepted for funding by ANR:
**E–SCAPE** (PI: Aymeric Delteil)
**GOPOWER** (PI: Ekaterine Chikoidze)
**SUPERNICKEL** (local PI: Joseph Scola)

**1/07/2021**
Welcome to **Subodh Gautam**, post-doctoral researcher (team DIAM)

**14/06/2021**
Welcome to **Séléna Rippe**, engineering student (team OEN)

**26/05/2021**
Welcome to **Domitille Gérard**, master student (M1, team OEN)

**7/04/2021**
Welcome to the new members:
**Hadji Adama Seck,** master student (M1, team P2MC);
**Rémi Legrand**, DUT intern (team Fox);

**2/03/2021**

Welcome to the new members:

**Thi Huyen Guyen**, master student in GEMaC (team OEN) and LuMIn;

**Krishnaraja Acharya**, master student (team FOX);

**Idris Aboubakari**, master student (team NSP);

**Nour Eddine Riahi**, master student (team NSP).

**3/02/2021**

The project *eDiamant*, involving GEMaC, is recipient of the call for project  EquipEx+!

**4/01/2021**

Welcome to **Nour Belmouri**, PhD student in team P2MC !

**1/12/2020**

Welcome to **Mohamed Bouras**, new post-doc in team DIAM !

**1/10/2020**

Welcome to four new recruits: **Yoan Bourlier** (post-doc in team FOX), **Clarisse Fournier** (PhD student, team OEN), **Zeyu Chi** (PhD student, team FOX) et **Gia Long Ngo** (PhD student, team OEN).