The future is here and now

apprenticeship
apprentice training centre
research and innovation
company partnerships
printed electronics
circular economy
master's degrees
green carbon
bio-based materials
cross-media communication
Springboard for a new generation of engineers

Grenoble INP pagora TOWARDS A SUSTAINABLE WORLD
Bioeconomy in France and abroad
Circular economy and energy transition
Technological mutation of traditional industries

International partners
Academic and industrial

INNOVATION CLUSTERS
Axelera, Minalogic, IAR, Tenerrdis...

Grenoble INP
Training and research excellence

INSTITUT CARNOT
PolyNat
Functional bio-based materials

LGP2 / CNRS
PhD students
Fundamental and applied research

LABORATOIRE D’EXCELLENCE
Tec 21
Clean engineering processes

Pagora
From vegetable biomass, to functionalised bio-based materials, to printed electronics
Reducing climate impact
Boasting an array of useful properties, bio-based materials have what it takes to replace energy hungry and non-renewable products and fuels. Sectors specialising in the management of biomass, the processing of plant fibres and the manufacture of bio-based products undoubtedly have a major role to play in the energy transition and the battle against climate change.

→ Green carbon and the circular economy: keys to sustainable development
Our planet generates between 100 and 200 billion tonnes of plant biomass per year. The quantity usable today is in the region of 0.5 to 1 billion tonnes per year. This biomass, half of which is cellulose, is a fantastic raw material: it is natural, renewable, recyclable (72.5% of Europe’s paper and cardboard is recycled in 2018*), possesses remarkable properties and can be processed, functionalised and reused, with a generally neutral carbon footprint.

→ A brave new world
The coming decades will see the rapid development of production processes that make use of biomass. Not only can the cellulose, hemicelluloses and lignin extracted be transformed into paper pulp, they also enable the production of:

• **energy** [2nd generation biofuels, i.e. fuels made from natural non-food resources, biogas, etc.]
• **bioproducts** (chemical, pharmaceutical, cosmetic, medical and food applications)
• **biomaterials** (including paper and cardboard, biopolymers and biocomposites), which can be functionalised to equip them with certain mechanical, optical, barrier or electronic properties. This functionalisation can notably be achieved through printing processes than can produce new materials very cost effectively and with less environmental impact, thus generating significant market opportunities in the fields of **printed electronics and multi- and cross-media communication**.

→ A challenge for the future
Mastery of key skills
• **Biomass-based materials**
• **Associated processes** (biorefinery, green chemistry, process engineering, etc.)
• **Re-use of natural and industrial waste**
• **Functionalisation of surfaces** to produce smart, high-value-added materials
• **Cross-media communication**
• **Printed electronics**
• **Environmental management**...

These are just some of the strategic skills developed by graduates of Grenoble INP-Pagora, skills made all the more precious by the fact that they remain rare and play a crucial role in the use of biomass and its derivatives.

*Source : European Paper Recycling Council, 2018

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Cellulose fibre

Bio-based materials

Process control

Printed electronics

Paper

Printed media

Packaging

Biomass

Recycling
The future is here and now
Since its creation, Grenoble INP-Pagora, one of Grenoble INP’s six engineering schools, has been intrinsically linked to innovative, job-creating sectors. The skills of its graduates are recognised far beyond France’s borders (17% work abroad). A quarter hold management roles.

→ A particularly favourable environment
A strong partnership
• With innovative business sectors and industries undergoing rapid technological changes: company visits, internships, conferences, case studies, placements, etc..
• With universities and companies, both for academic training and research.
A strong investment in research
• The school’s high-level research is performed at LGP2 (Grenoble INP and CNRS laboratory) which works in close conjunction with many prestigious organisations (the Carnot Institute - PolyNat, Laboratoire d’Excellence Tec 21, Innovation Clusters, etc...)
• Cutting-edge laboratory facilities and industrial pilots.

A stimulated learning environment
• Highly innovative teaching methods (project-based learning, a skills-oriented approach, career planning).
• Apprenticeship training recognized by the industrial world since 1994 (two apprenticeship offers per applicant).
• A commitment to sustainable development and to training socially responsible engineers in accordance with “quality, safety and environment” standards (ISO 9001, OHSAS 18001 and ISO 14001), an almost unprecedented step for an engineering school
• A vibrant and open environment thanks to the diversity of the school’s personnel (public and private).

“The school’s size allows for fruitful interaction, rapid integration of new starters, a friendly atmosphere and the existence of a “Pagorien” spirit that lasts much longer than a student’s three years of study!”

→ Training programs

Engineering
A specialist diploma
Paper, print media and biomaterials science
Two options
• Fibre and biomaterials engineering
• Printed media engineering

Master
• Materials Science and Engineering: program Biorefinery and Biomaterials

Vocational degree
Interactive printed and digital media
To help improve the lives of future generations, the world of Pagora is slanted towards the emergence of a bioeconomy, one built upon bio-based materials (made from renewable resources) that are recyclable (circular economy) and equipped with smart functions.

**FIELDS OF APPLICATION**

- **Biomaterials / Biopolymers**
  - Biocomposites / Paper / Fibres
  - Construction
  - Packaging
  - Transport
  - Textiles
  - Communication

- **Bioenergy**
  - 2nd generation biofuels
  - Biogas
  - Cogeneration

- **Bioproducts**
  - Green chemistry
  - Pharmaceuticals
  - Cosmetics
  - Medical science
  - Food

- **Surface functionalisation**
  - Cross-media communication
  - Printed electronics
  - Barrier properties
  - Smart packaging
  - Housing

→ shaping a sensible and renewable future

Green carbon