Lamberti

Designing new values in chemistry

The Design of the Invisible

Chemistry for the Innovation of Materials

April 19th 2024 | 5 p.m.
Superstudio Più
Via Tortona 27
Milan

MATERIALLY

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Paolo Lamberti
A Centenary Chemistry:
Research, Innovation, Design
Simona Esposito
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The Design of the Invisible
Chemistry for the Innovation of Materials

In energy, food, furnishings, textiles, automotive, the realm of product systems lies in the domain of form and performance, governed by **chemical and physical enchantments**, sometimes **drawn from nature** and its solutions. Skillful chemistry orchestrates the majority of involved molecules to react, forming functional compounds seamlessly integrated into the final product, devoid of reaction byproducts, while reducing or completely eliminating emissions, thereby producing artifacts of enhanced durability. This dimension of chemistry, often dubbed **specialty chemistry**, navigates the sphere of **small yet extraordinary material transformations**, akin to a **molecular super-design** enabling diverse materials and surfaces to amplify or metamorphose their own performances.

The liaison between design, chemistry, and materials science is well-established: one of the most intriguing frontiers of design culture lies in systems emanating from raw materials and their behaviors.

Molecular design fortifies the design process within integrated functional devices and material development, rendering them more processable with enhanced simplicity and reliability, suited for the transformation pipeline. Polyurethanes derived from renewable sources, acrylic and natural polymers, oleochemical derivatives – the world of material design enriches itself multidisciplinarily with novel tools and solutions.

At the encounter titled "**The Design of the Invisible**" organized at *Superstudio Più by Materially - Design Week 2024, with Lamberti*, **three cases** exemplify the relationship between **Design and Chemistry**:

1. Advantages in processing ceramic and glassy materials derived from observing nature.
2. Research enabling precise treatment of substrates and surfaces (wood, leather, iron, paper, paints) with evolving aesthetics, haptic perception, and material-environment relationships.
3. Overcoming solvent usage through diversified solutions, even recycling industry food processing waste to create new paper protection treatments for meat and vegetable packaging.

The discipline addressing the environmental impact of industrial production and designing reactions within materials' lifecycle is **molecular design**: it harmonizes vertical competencies (chemical, physical, geological, technological), industrial processes, and broad environmental knowledge.

Chemistry is the science of nature and humanity: today, it fosters new values and has the potential to support significant shifts towards tangible social, economic, and environmental sustainability.

Speakers

Paolo Lamberti

President and CEO Lamberti
Cavaliere del Lavoro

As President, he is leading the expansion of the company and its development through the acquisition of several companies in Italy and abroad.

From 2017 to 2023, he served as the **President of Federchimica -** ***Italian Association of the Chemical Industry***
Previously, he has held the position of President of LUIC – Carlo Cattaneo University, of which he serves as Board Member of the Executive Committee.

Education

MSc in Economics - Catholic University of Milan
MBA – Wharton School University of Pennsylvania

Simona Esposito

Synthetic Polymers Technology Manager

Simona, aged 49, brings extensive experience in various roles in LyondellBasell, Pirelli and Lamberti for the last 20 years.
Simona applies her expertise and scientific vision effectively in the practical pursuit of solutions that meet market demands. She contributes to identifying corporate strategic objectives and to coordinate research projects involving different business areas and related to new products, new application sectors and technologies.

Author and co-author of several scientific publications in international journals and about 20 patents (polymers, chemical additives for the industry).

Career at Lamberti

2023-Today
Synthetic Polymers Technology Manager
2017-2023
Innovation Manager
2013-2017
Research Project Management

Education

MSc Industrial Chemistry
PhD Macromolecular Chemistry

Simone Tassi

Ceramics Division Director

Simone, aged 53, has structured his management approach around fostering teamwork cooperation and promoting innovation-driven development.

Career at Lamberti

2021-present
Ceramics Division Director
2015 - 2020
Business Manager Paper BU
2009 - 2014
Export Manager Paper BU

Education

MSc Chemistry
BSc
Marketing and Business Admin

Ferruccio Mauri

Commercial Manager Polymer Beads Platform

Ferruccio, aged 55, brings 30 years of experience in the technical commercial sector, having held diverse positions in different companies.
His management style prioritizes problem-solving and is characterized by a deep curiosity and open-mindedness

Career at Lamberti

2020 – present
Commercial Manager Polymer Beads Platform
2016 - 2020
Global Product Manager Microspheres and Wood
1993 - 2016
Business and marketing director

Gabriele Costa

Global Product Manager Biobased Solutions

Gabriele, aged 46, thanks to his attitude for experimentation and innovation, has accumulated a rich and varied professional background both as technical and international management perspectives. His managerial approach is characterized by a constant drive for change and innovation.

Career at Lamberti

2020-present
Global Product Manager Biobased Solutions
2016-2020
Business Unit Manager
2012-2016
Business Development Manager - Asia Pacific, Shanghai
2012-2016
R&D and Technical Director - Polyurethane Technology

Education

MSc in Chemical Engineering

Case Study 1 | Ceramics
The Intelligence of Matter: Innovation based on Nature's Design

Tenagreen stems from a process of vision, analysis, and design conducted in collaboration with the leading ceramic companies in the **Sassuolo district**, the most important in the world. The demand for innovation arose from the need to provide the production system with a **solution capable of reducing thicknesses, weights, and related emissions, particularly for the production of large ceramic slabs**. The sustainability of production and the entire supply chain in its components has indeed become an indispensable factor, starting from the possibility of **replacing precious clays** that entail logistical and environmental problems and that may suffer interruptions in international supply chains, as happened following the pandemic and wars.

These interruptions in international raw material supplies have accelerated the search for **alternative solutions to precious clays**, with **local materials of lower plastic qualities**. The process integrated the original request for the reduction of direct and indirect emissions, weights, and materials used in the production of large slabs, involving the need to increase the quality and workability of very different and certainly less performing soils and clays.

The multiplicity of research and development laboratories, the experience with different materials and fields, the richness of disciplinary skills present in the company, have allowed, through continuous exchanges and transfers of technology and knowledge, to orient the design towards **bio-mimetic design processes: the inspiration was already present in nature.**

Trees, when struck by the wind, bend, rarely break. Their fibers have specific properties that allow them to be resistant but not rigid, they are immersed in natural compounds such as hemicelluloses, which manage to give them the right deformability and elasticity. Based on synthetic/natural grafted copolymers, **Tenagreen,** by acting in a similar way to tree fibers, integrate the molecular composition of the soils used, confer elasticity to ceramic slabs before their firing, bind to the **ceramic microstructure of the large slab** imparting **elasticity** and **resistance to breakage.** These new characteristics allow ceramicists to produce much **thinner slabs,** to use **less methane gas** for their firing, to **use a mix of less precious or recovery ceramic soils** (also local), and to **produce semi-transparent vitrified ceramic slabs.**

Tenagreen represents a **paradigm shift** in ceramic production, driven by a commitment to sustainability and innovation. By harnessing the **principles of bio-mimicry** and leveraging collaborative expertise, this initiative offers tangible solutions to the challenges facing the industry while paving the way for a more sustainable future.

Case Study 2 | Surface Treatment

Materials and Surfaces: Performances and Haptic Effects

What surrounds us and is shaped by humans inherently carries within it **the life and nature of matter**, which is essence and foundational part, limit, and opportunity: reclaiming the material, its **molecular matrix** means rethinking and advancing towards a **design idea that is not only aesthetic expression but generative.**

The profound knowledge of chemistry and the extensive experience in material treatment, accumulated by our company over more than a century, allow us to focus on the specific needs of different industrial sectors. Resistance to wear and scratches, resistance to corrosion and chemical and atmospheric agents, appearance, color, tactile effects are the properties that need to be imparted to surfaces and materials to make them available for design and industry.

The study of these properties is the basis of **specialty chemistry,** evolving from synthetic chemistry into **transitional chemistry**, which integrates with physics, biology, and incorporates the concept of responsibility as an indispensable element for development.

In the creation of high-performance materials, resistant and with specific haptic characteristics (appearance, color, tactility), material treatment chemistry has moved from solvent-based solutions with high impact on health and the environment to aqueous systems based on synthetic polymers in various physical forms (solutions, dispersions, microspheres) to progressively find more durable, recyclable, and low-impact solutions.

Lamberti, in continuous search of simplification and sustainability, inspired by **the age-old wisdom of nature**, has developed **new hydroxyapatite-based microspheres**, a fundamental mineral for life as it is one of the main constituents of bones and teeth of living beings.

Like our teeth, hydroxyapatite microspheres are also characterized by great elasticity, resistance to wear, and corrosive action of external agents. Nature has developed this material to be durable and sustainable during the life cycle of living beings, Lamberti researches with hydroxyapatite, the same impact with surfaces and materials used daily.

The application possibilities are wide and diverse: **hydroxyapatite can confer tactile and optical effects through surface application** or, if incorporated directly into the **matrix,** as in the case of plastic, it can provide **flame-retardant properties.** This innovative approach has opened up new avenues to improve the performance and sustainability of products in various industrial sectors, demonstrating our expertise in finding advanced and sustainable solutions.

Case Study 3 | Paper
New Surface Treatments in Packaging Design

Packaging plays a crucial role in our food system, protecting products, minimizing waste, and extending shelf life. Despite efforts towards recycling, only **9% of plastic packaging produced in 2020 was recycled**. Governments, through initiatives like the **EU Green Deal** and **its ban on single-use plastics**, are pushing the industry towards sustainable alternatives.

Paper is considered eco-friendly packaging when sourced from certified forests, with a structured recycling chain and intrinsic biodegradability/compostability.
To ensure product shelf life and integrity, **paper packaging requires functional treatments** to enhance properties **like barrier performance.**
Lamberti has developed a specific product line to convert cellulose materials with **water-based coating treatments**, eliminating the need of laminated films, for flexible packaging. **These products incorporates an increasing amount of biobased polymer, up to 100%** and offer **barrier properties against water, oil, grease**, and specific substances for packaging safety.
They provide excellent heat sealing, a crucial characteristic for the flexible packaging market, and comply with current regulations.

The contemporary challenge lies in developing coatings with sustainable materials, without conventional plastics, while maintaining essential barrier properties and consumer acceptability.

From this challenge **arises new research inspired by Nature**.

Plant skines, primarily composed of **cutin**, protect fruits, leaves, and stems from environmental threats since millions of years.

Drawing inspiration from the barrier capacity of plant cuticles, we have developed a dispersion of natural cutin extracted from tomato peels. **Tomatoes**, with a global production of **187 million tons** annually, generate approximately **7 million tons** of **peels** per year, representing a valuable resource for cutin extraction.
Using readily available **agricultural by-products** aligns with the principles of circular economy, minimizing waste and environmental impact.

Lamberti has developed water-based solutions to expedite the transition towards sustainable and high-performance packaging. Its wide range **Esacote® BIO 25, Esacote® BIO 50, and Esacote® BIO BC 100,** embodies a **responsible biomimetic approach to innovation**, meeting the demands for sustainable and recyclable packaging, anticipating future regulations and consumer expectations.

AI-created image of molecular structures

Lamberti
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Lamberti was founded in Lombardy in **1911**. Distinct in spirit and approach from holdings, it is an innovative enterprise, financially sound, that has grown constantly over the years.
Active across various application fields with proprietary technologies and functional products, Lamberti operates globally with sales teams and networks, research and development centers, and industrial facilities based on cross-cutting technologies and disciplines.

Technological platforms cover different chemistries, from Natural to Synthetic Polymers, from Oleochemistry to Polymeric Beads, serving the sectors of cosmetics, agriculture, ceramics, surface treatment with various materials, oil & gas, and textiles/leather, with **special care for people and the planet**. Lamberti's Research and Development involves over **200 researchers** across more than **10 synthesis laboratories** and **20 application laboratories**, with **548 active patents**.

Innovative technologies, high-quality raw materials of natural origin, energy from renewable sources, progressive emission reduction, and continuous improvement define the pace, driven by new technologies and digitalization, as well as the growing demand for environmental protection and resource efficiency.

Lamberti is an exemplary **Italian industrial story**: it embodies the prototype of a working community that, operating in a territory rich in ingenuity and skills, full of needs and challenges, has **grown over time** in international markets, gaining national and international relevance.

Lamberti collaborates with clients, suppliers, equipment manufacturers, and international scientific laboratories to address and **manage complexity through a collaborative approach.**
It is part of an international network of technological platforms, research laboratories, and production facilities and is among the main **scientific contributors** to the world's most advanced industrial districts.

Download the materials

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