

De la chimie des monomères aux Polyamides chez Solvay

Laboratoire SPP, Lyon



SOLVAY

asking more from chemistry®

M-L Michon
Solvay
Research & Innovation

We are a world leader in the chemical industry



Created by Ernest Solvay in 1863, Solvay is a **Global** company, with historical anchorage in Europe, and headquartered in Brussels.



26,000
employees



119
industrial sites



15
major
R&I centers



52
countries



€ 10,213
million of net sales



€ 1,783
million of REBITDA

2014 figures

150 years of innovation and many to come



1863

Ernest Solvay invents the Solvay process for producing soda ash



1880

Solvay is the first industrial multinational operating simultaneously in the US and Europe



1878

Solvay innovates in social welfare (paid vacations, social security, 8-hour day)



1950

Solvay invents the plastic bottle



1990

Solvay invents precipitated silica for green tires



2015

Solvay flies around the world with Solar Impulse



1911 & 1927

The congresses bring together the greatest physicists of their day



2011

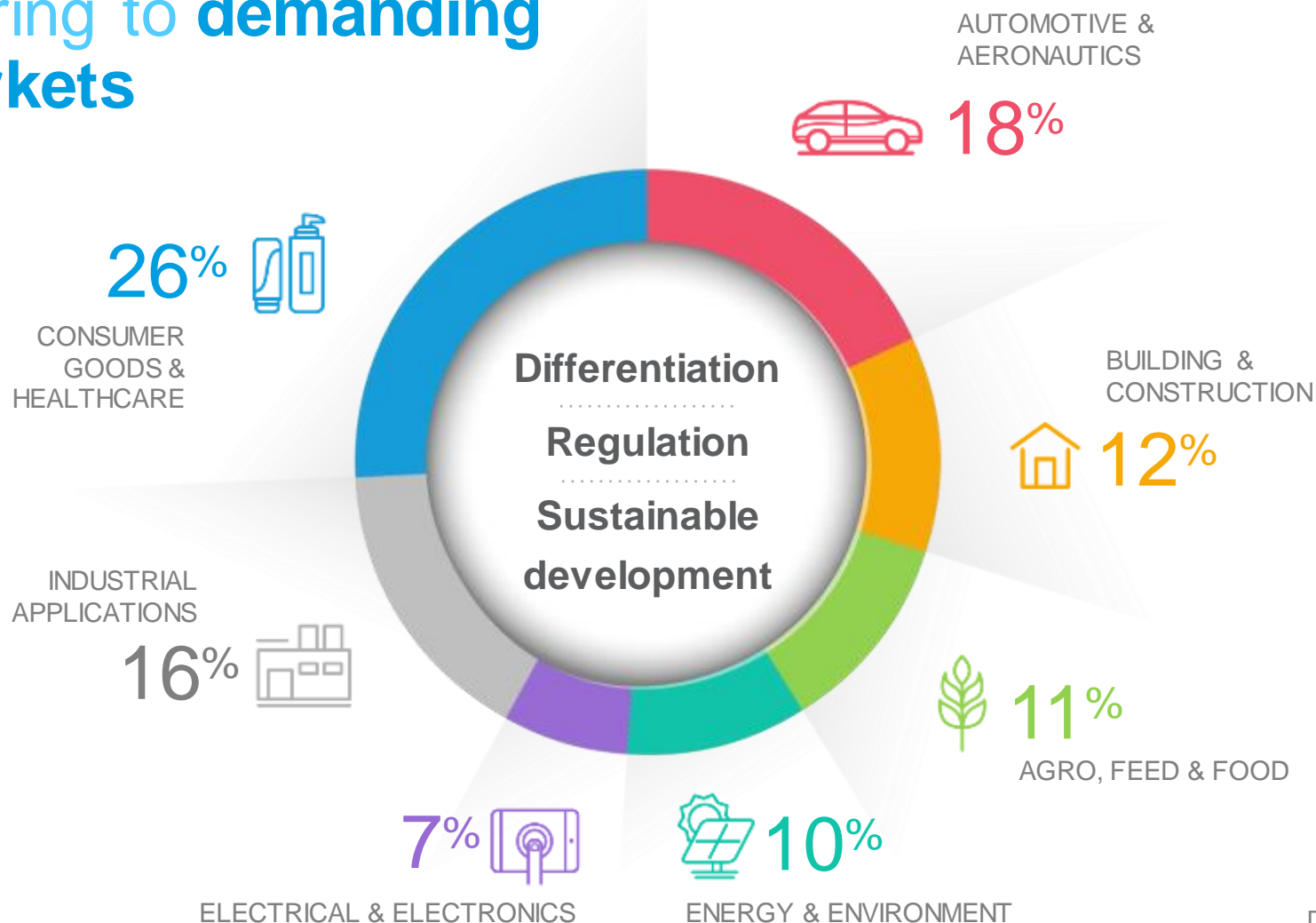
Solvay acquires Rhodia



2015

2nd Chemistry for the Future Solvay Prize

We adapt our product offering to **demanding** markets



Distribution
of 2014 net sales

Research & Innovation



Strong Research & Innovation Presence Worldwide

Solvay's R&I close to markets, customers and trends



Joint Labs - Connectors to scientific networks

LOF Lab of the Future

Bordeaux, France



COMPASS Complex Assemblies of Soft Matter Lab

Bristol, Pennsylvania, USA



Eco-Efficient Products and Processes Lab (E²P²L)

Shanghai, China

Polymers Advanced Lab

Lyon, France

**Joint laboratories with French National Scientific Research Center and Universities
– a strong link between fundamental and applied research**



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R&I Center – Lyon LSPP Lab

Solvay
Research & Innovation

R&I

RIC – Lyon competencies

- 490 people
- ISO 9001

“ The RIC-Lyon has expertise in **Organic Chemistry, Chemical Engineering, Material science, Analytical experience** to provide answers and solutions to its customers ”

Organic Chemistry



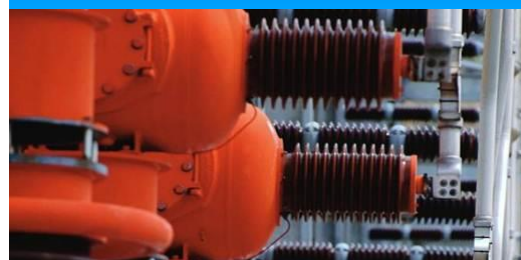
Aroma
Catalysis
Green Solvents
Inhibitors
Monomers & intermediates
Polymers synthesis
Pilots, scale-up

Material Science



- **Bio-based polymers**
- **Engineering Plastics**
- **Functional Polymers**
- **Modeling**
- **Reinforcement fillers**
- **Structural Composites**

Process & Technology Innovation



- **Process engineering**
- **Eco-Efficiency evaluation**
- **Environment solutions**
- **Advanced Modeling**
- **Process Safety**

Organic Analysis

Material Analysis
Analysis Department

Industrial Analysis

R&I Europe - Synthesis & Process Polymer Lab

Our Missions

- Define new *polymers* to fit the customer needs,
- Realize the *development phases* to validate the best industrial process to produce it.
- Optimize the industrial assets

***From exploratory
studies***



***To industrial
polymers***

Synthesis & Process Polymer Lab a team joining chemistry and process polymer expertise

Our skills

■ Polymer chemistry

Recognized knowledge in bulk **polycondensation**, **functionalization** and **solid-state post-condensation**.

Polymer lots **production for customer sampling**.

Comprehension of the **ageing mechanisms** (thermal & glycol ageing, hydrolysis).

■ Polymer process

Technology referent lab in **polycondensation** (polyamide and polyester).

Develop **new polymer processes** (for existing or new polymers)

Spinning and filming at pilot scale



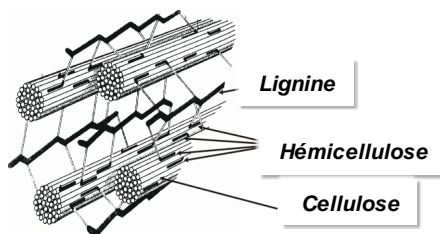
Polywood – How to obtain new biobased polymers ?

ideation step

AXELERA
catalyseur de croissance durable



Biobased feedstocks: no competition with food



Valorization of side products of the paper industry

Biobased Monomer Synthesis

Biobased Polyamide Synthesis

Polyamide Formulation

WP 3
Sugars production

WP 4
Monomer production
Leader SOLVAY












WP 5
Polymer production
Leader SOLVAY

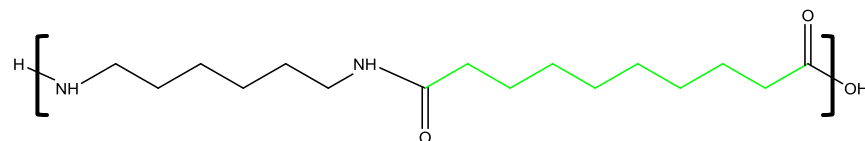
WP 6
Polymer formulation



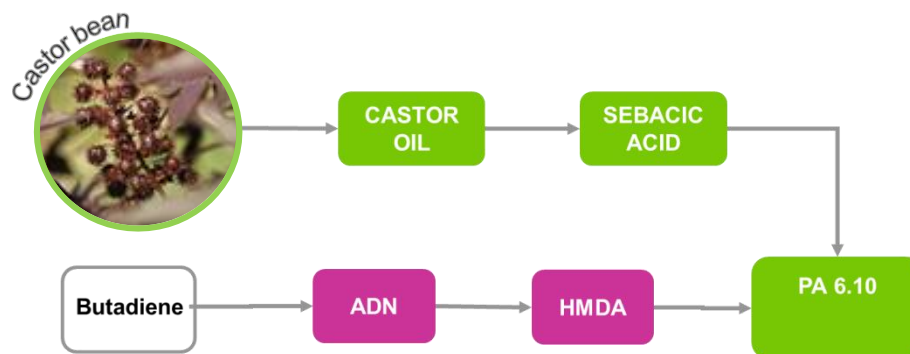
FUI 2012-2016
Polyamides bio-sourcés issus de la filière papetière
14 partenaires
8 industriels, 5 labos académiques, 1 centre technique industriel

PA 6.10 – an industrial polyamide

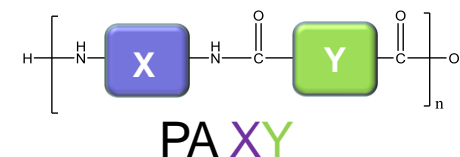
Stabamid® 6.10		
	Temperature resistance	 ★★★★★
	Fuel Barrier	 ★★★★★
	Abrasion Resistance	 ★★★
	Chemical Resistance	★★★
	Easy Processing	★★★
	Moisture absorption (24h)	★★★
	Impact Resistance	★★
	Mechanical	★★



PA 610 = 63 % biobased content (carbon)



Main drivers for (co)polymer development



Tg modulation (increase/decrease)
Flexibility/Stiffness (E' modulation)
Adhesion to inorganic particles
Hydrophobic – dimensional stability
Thermo-oxidative stability
Fuel barrier properties
Gas barrier properties
Solvent resistance (acids)
Fire retardancy
UV stability
Hydrophylic
Elasticity
Stainability
Anti-bacterial
Processing : high viscosity
Processing : high flow
Biosourced

For many markets



Textile

Fluid barrier

Transport

Automotive

Industrial yarns

Building & construction

Consumer goods

Electric & Electronics



Coherent Lab scale equipment to validate New polymer properties

Polymer Synthesis



Lab reactor :
80g to 80Kg



Solid state
polycondensation
1-100kg

Spinning & Compounding



Spinning line :
- to evaluate the spinnability of new polymers.
- to produce yarns to evaluate the initial properties



Microcompounder



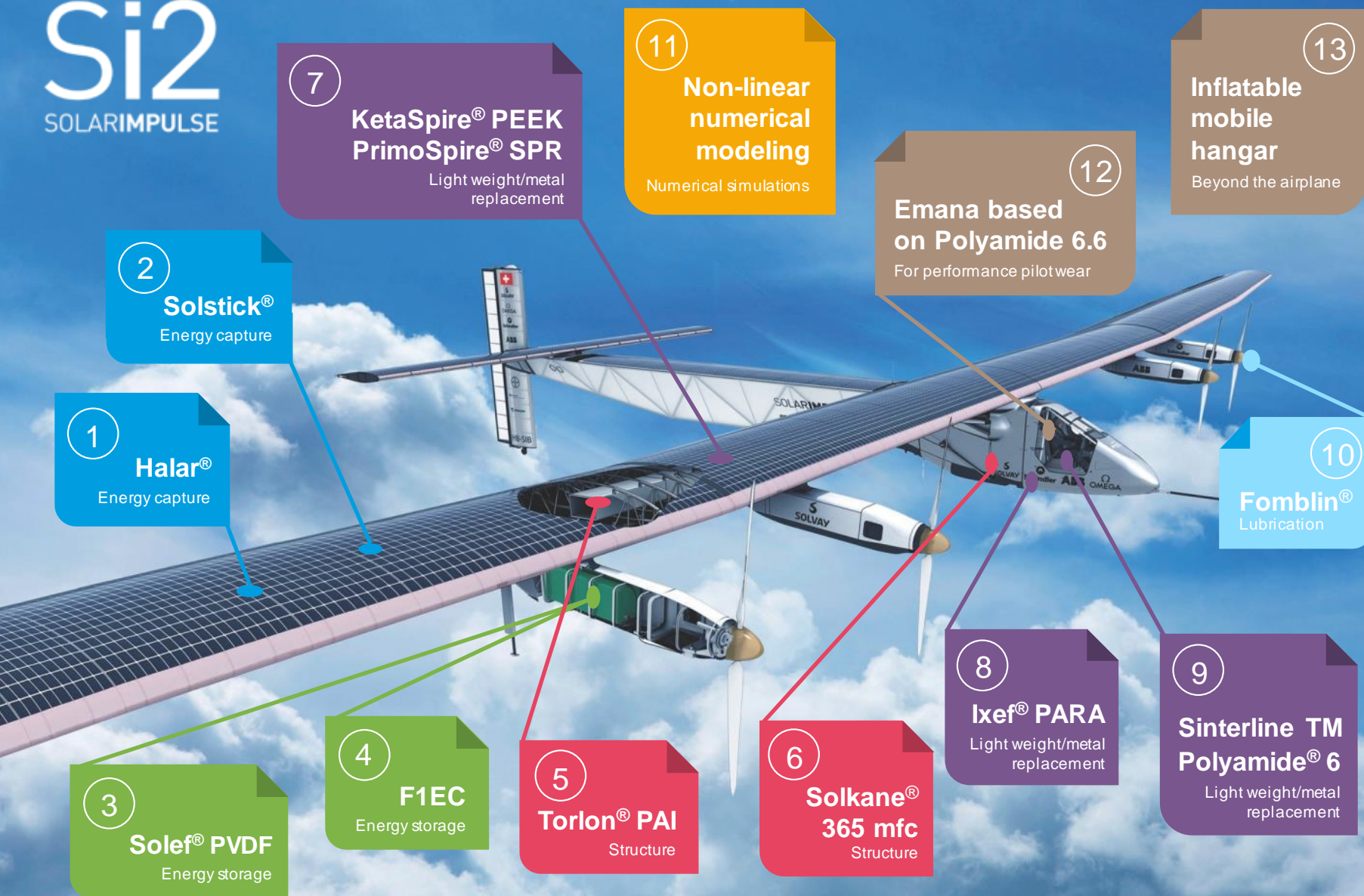
Twin screw extruder

10g - 10 Kg (soon 100 kg)

Solvay partner of Solar Impulse

From day one and for ten years now, Solvay has been part of the Solar Impulse adventurous and daring project, which in 2004 many thought was inconceivable. Thanks to this “Flying Lab” Solvay could put into practice its expertise in advanced materials and sustainable energy, enabling Solar Impulse to fly day and night on the sun’s energy only.

This project has pushed the boundaries of innovation, technical know-how and an entrepreneurial team spirit that has made the impossible possible.



THANK YOU

www.solvay.com



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