



– Press release –

## CARBIOS opens a new biological pathway with its one-step PLA production process

**Clermont-Ferrand, July 6, 2016** – CARBIOS (NYSE Alternext Paris : ALCRB/ Eligible PEA-PME), an innovative green chemistry company specializing in breakthrough technologies dedicated to the recovery of plastic waste, today announced that it has taken a major step forward with the validation of its *in vivo* enzymatic polymerisation process of lactic acid into a high-molecular weight homo-polymer of PLA.

Among bio-sourced polymers, PLA is currently one of the most promising on the market due to its remarkable properties, which satisfy a large range of applications<sup>1</sup>. With a world-production capacity of 190 000 tons per year<sup>2</sup>, margins for progress remain considerable. In 2020, PLA production capacity could reach 400 000 tons worldwide, corresponding to a fluid growth rate of 15% per year<sup>3</sup>.

On an industrial scale, current processes for the production of PLA require an expensive intermediary step consisting of the condensation of lactic acid (oligomerisation and cyclisation) into a lactid (a cyclic diester). This intermediary component must then be purified and chemically polymerized to obtain PLA.

The technological breakthrough brought by CARBIOS cuts out this intermediary step and produces, with greater competitiveness, a high-molecular weight homo-polymer of PLA directly from lactic acid. *“My partners and I are proud to have successfully met this scientific challenge, and to have developed the first microorganism capable of producing a 100% PLA polymer of high-molecular weight,”* says Alain Marty, Chief Scientific Officer of CARBIOS.

This result was achieved with help from the Toulouse-based teams of the INRA and the INSA (TWB and the LISPB), partners of CARBIOS as part of the collaborative research and development program THANAPLAST™. *“To conceive an original metabolic pathway to synthesize PLA was a true scientific and technological challenge of industrial biology,”* says Pierre Monsan, Director of TWB.

This milestone will enable CARBIOS to continue to the pre-pilot scale of this PLA production process within the initial deadline, thus allowing the possibility of considering potential agreements with industrials of the sector in the very near future.

The technologies applied to the production of PLA could also be used for the production of other biopolymers, notably other polyesters like polyhydroxyalkanoates (PHAs). This market, currently a low-tonnage market, has an estimated growth potential of 28% between now and 2018<sup>4</sup> and addresses the same concerns as PLA production: produce a bioplastic that is competitive with

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<sup>1</sup> Range of applications for PLA: food packaging, medical applications, fibres & textiles, etc.

<sup>2</sup> Source: Nova Institute and European Bioplastics in 2011

<sup>3</sup> Source: Ceresana Research in 2011 and Research and Markets in 2013

<sup>4</sup> Source : Markets and Markets in 2013

conventional plastics in terms of cost and performance and will limit the use of fossil- and food-based resources.

At year-end 2015, CARBIOS' intellectual property portfolio was comprised of 5 patent families protecting the processes for the production of bio-polymers and 17 patent families for all the processes developed by the company.

*"Since the launch of the THANAPLAST™ project, we have announced our will to develop, by biological means, a bioprocess for the production of PLA so to increase competitiveness of one of the most promising bio-sourced polymers on the market. Today, it has become a reality that will enable us to work with large industrials so to establish our technology in a quickly growing market. This innovation, a result of our collaborative model, is perfectly in line with the recent direction outlined by the French "Energetic Transition Law" for green growth and the emergence of bio-sourced products,"* says Jean-Claude Lumaret, CEO of CARBIOS.

### **About CARBIOS:**

[CARBIOS](#) is a young, innovative green chemistry company, whose mission is to find biological solutions to the environmental and sustainable development issues faced by industrial businesses today. CARBIOS acquired the rights to research that was conducted over a number of years by various public and private sector laboratories. By leveraging the unique properties of biological catalysts (enzymes), it has used this research as the foundation for developing innovative industrial bioprocesses that optimize the technical, economic and environmental performance of polymers (thermoplastic materials and synthetic or food-based fibers). The company has focused its efforts on a strategic application sector: plastics. CARBIOS' growth strategy is based on a clear business model of industrial value creation that targets attractive markets, develops innovative and competitive bioprocesses and licenses them to major industrial stakeholders for commercialization. CARBIOS benefits from the financial support of the leading European venture capital firm [Truffle Capital](#). CARBIOS was founded in 2011 and has been managed, since its inception, by the  *Holding Incubatrice Chimie Verte* fund. CARBIOS was granted the label "Young Innovative Company" by Bpifrance (former OSEO) and is eligible for investments by private equity mutual funds (FCPIs). For more information, please visit: [www.carbios.fr](http://www.carbios.fr)

CARBIOS is eligible for the PEA-PME, a government program allowing French residents investing in SMEs to benefit from income tax rebates.



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