Bioplastics

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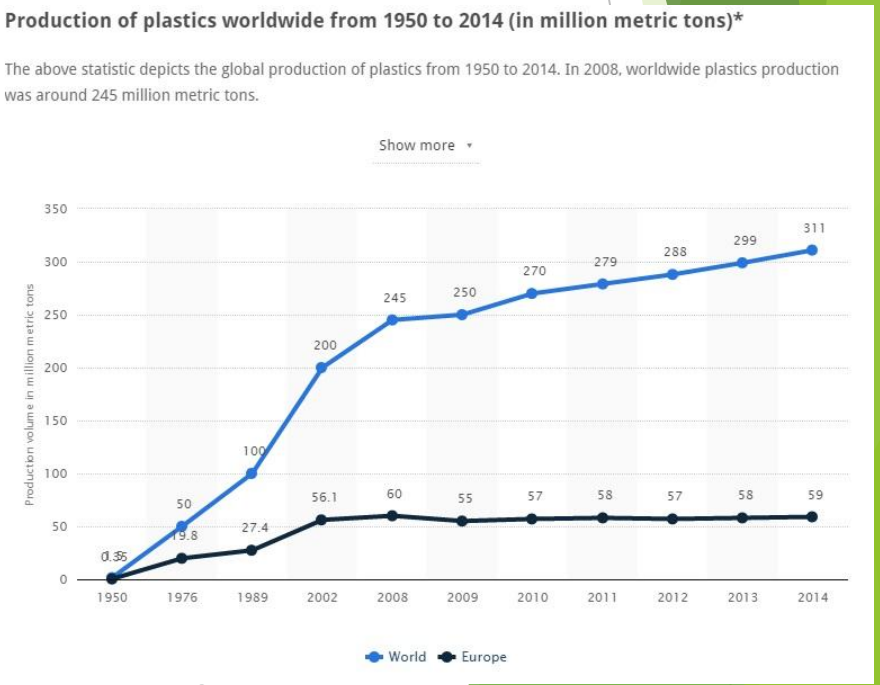
Plastics

- in 1907, 1st fully synthetic plastic (bakelite)
- low cost; ease of manufacture; versatility, imperviousness to water → used in an enormous and expanding range of products



http://www.statista.com/statistics/282732/global-production-of-plastics-since-1950/

But …

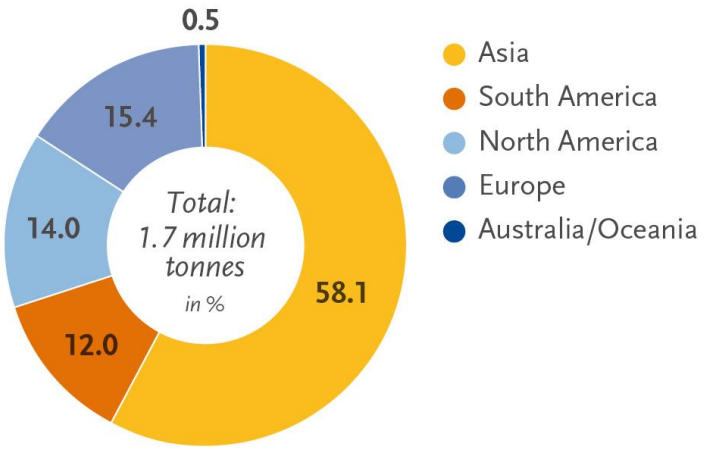
- decomposition (> 1000 years)
- landfills and pollution, and especially problematic to sea life
- non-renewable resource
- toxic and carcinogenic chemicals in their production
- large carbon footprint in both production and recycling

→ Bioplastic is developed as a replacement of plastic

Trend of bioplastic production

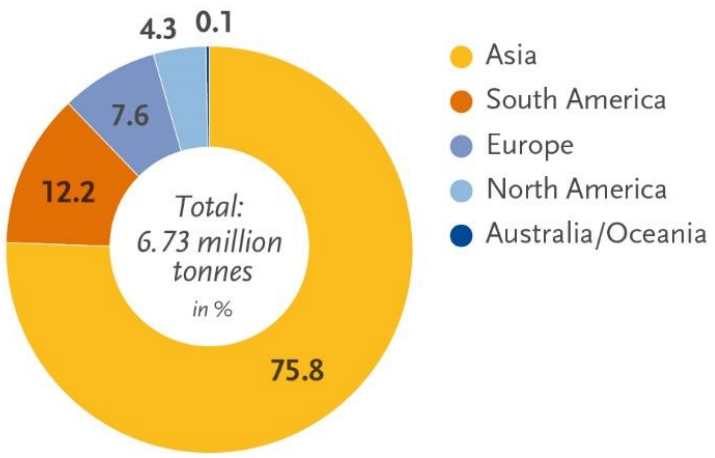
- 1% of plastic production annually
- increasing by 20 to 100 % per year
- around 85 % of plastics could be technically substituted

Global production capacities of bioplastics in 2014 (by region)



Source: European Bioplastics, Institute for Bioplastics and Biocomposites, nova-Institute (2015). More information: ***www.bio-based.eu/markets*** *and* ***www.downloads.ifbb-hannover.de***

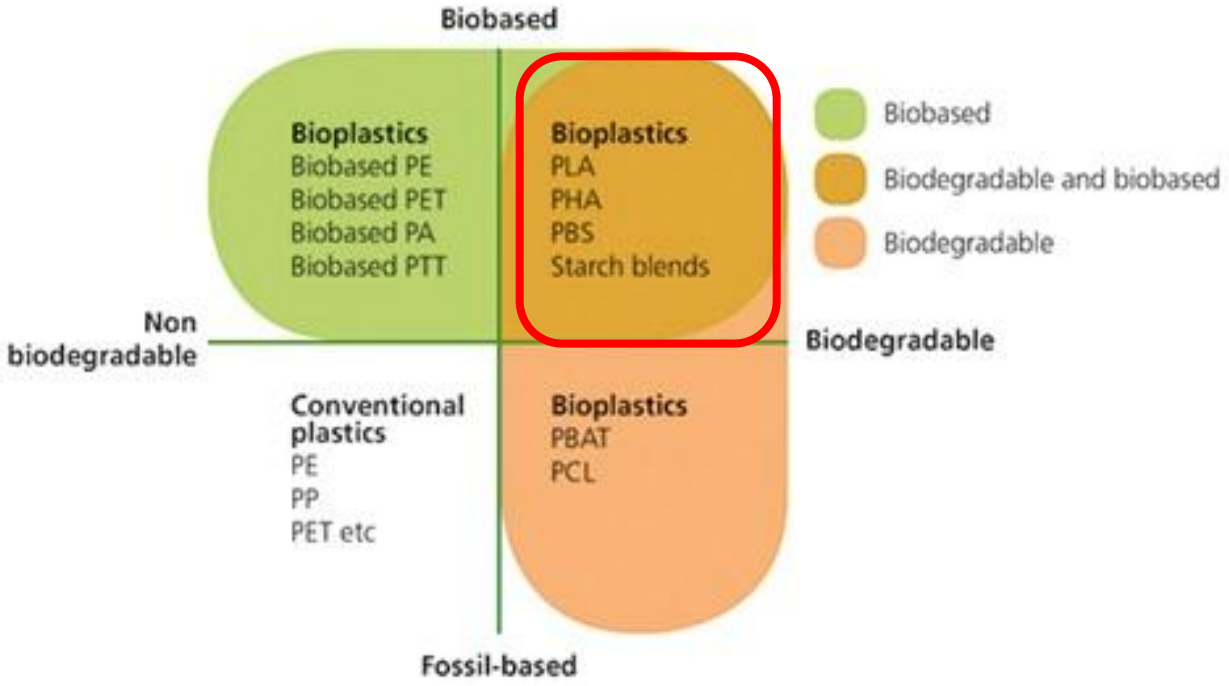
Global production capacities of bioplastics in 2018 (by region)



Source: European Bioplastics, Institute for Bioplastics and Biocomposites, nova-Institute (2014). More information: ***www.bio-based.eu/markets*** *and* ***www.downloads.ifbb-hannover.de***

Bioplastics

- defined as a plastic material which is either biobased, biodegradable, or features both properties, according to European Bioplastics



http://www.european-bioplastics.org/bioplastics/

Bioplastic products

Sources for making biodegradable bioplastics

For example:

- polysaccharides (starch, cellulose)
- proteins
- lipids

Crucial problem: high cost

And solution? WASTE

Example:
Polyhydroxyalkanoates (PHAs)

- bacterial production much more expensive ($16/kg) than common plastics ($0,25-0,5/kg)
- PHA from modified starch - price below $2,8/kg

- PHA from waste materials (non-food resources) should be competitive to common plastics

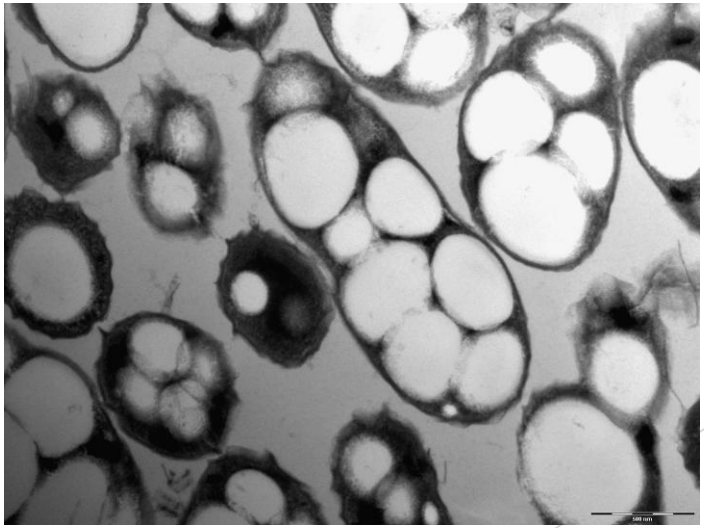
Hydal BioTech

founded by

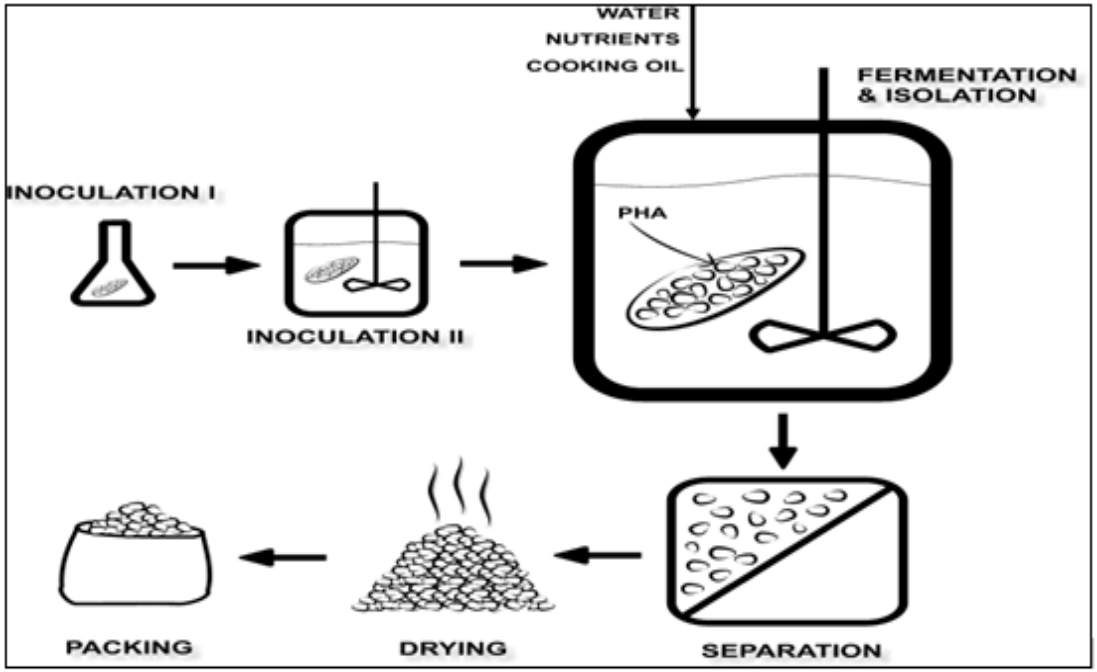
NAFIGATE corporation 江苏洁净环保科技有限公司 Jiangsu clean environmental technology Co., Ltd.

PHAs

- alternative energy source for bacteria
- intracellular
- formable at higher temperature
- water insoluble natural polyesters
- biodegradable – compostable (water and CO_2)



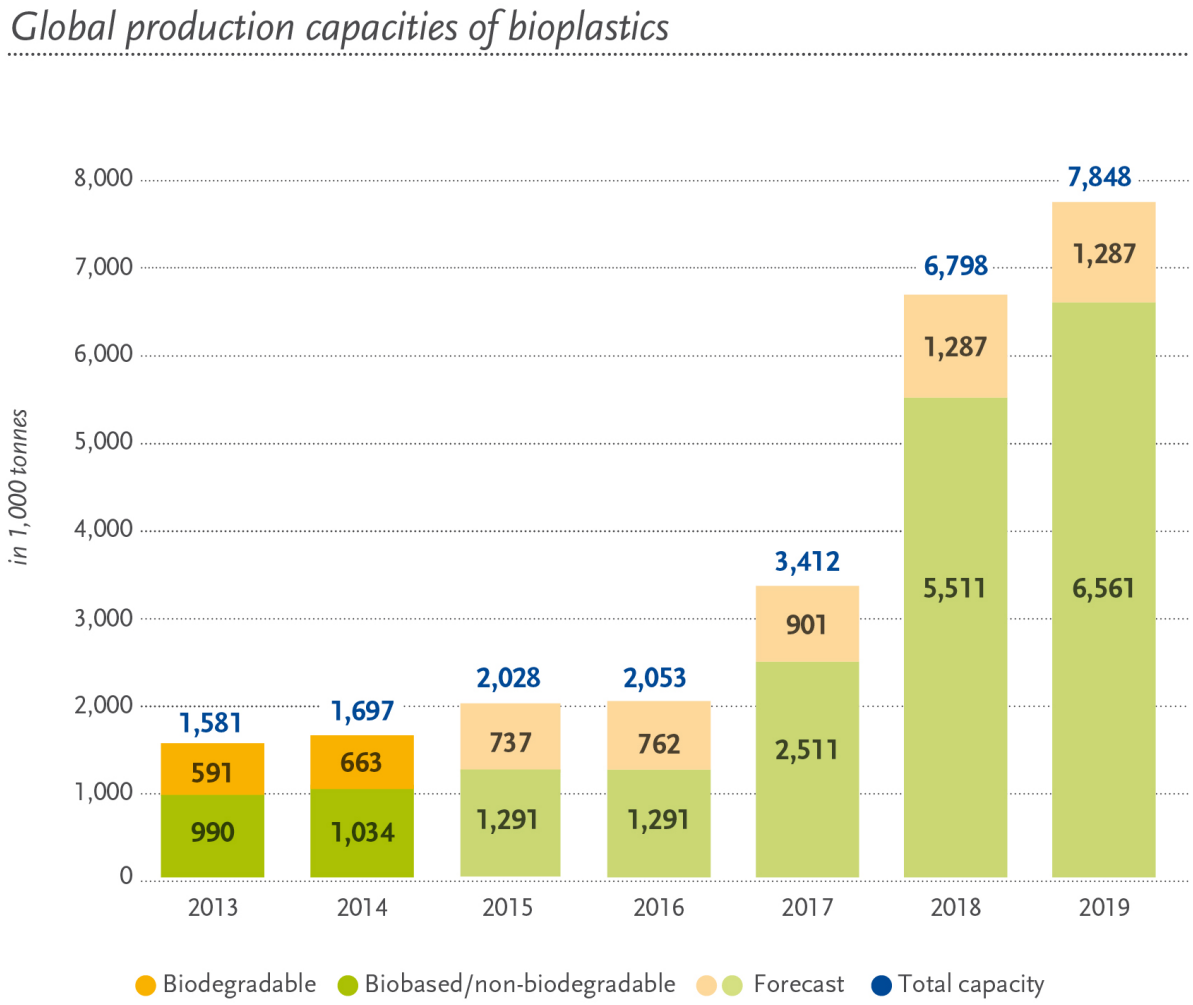
Production cycle



Problems:

- bacterial strain, optimization of growth, product isolation and purification
- still in research

Production trend of different types of bioplastics



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Future plans

- improve technology of bioplastics:
  - find more funding
  - attract more scientists
  - new sources
  - lowering the price of compostable bioplastics
- find investors and support new companies
- education of the public
- new legislation

Thank you for your attention!