Special Report (sample)

Front Runners in Sustainable Polymer Composites

Release month: 2023

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INTRODUCTION

About this report:

- This report provides a comprehensive overview of the leading players active in developing **sustainable polymer composites**.
- Scope of sustainable composite materials:
  - **Green biocomposites**: Both polymer matrix and reinforcing material are of bio origin (biodegradable biocomposites included)
  - **Hybrid biocomposites**: Either of the polymer matrix or reinforcing material is of bio origin
  - **Natural fibers**: Bio-based fibers that are used as reinforcing materials in polymer composites
- Companies covered can be start-ups or mid-sized companies having focused on their proprietary sustainable composite technology.
- Established players, conglomerates, research institutions and laboratories have not been captured.
- Each company has been profiled separately by outlining details around its technology, financials, relevant markets and intellectual property. Further, a 20-point assessment within Aranca 5 Factor Assessment Framework has been provided for each player.

Relevant audience:

- ✓ Established companies and conglomerates willing to explore and acquire start-ups
- ✓ Venture capitalists (VCs), institutional and individual investors

Customization:

- Report contents can be customized based on user requirements. Accordingly, report coverage shall be reduced or expanded to the specific areas of interest.

SUMMARY

Sustainable Composites

- Composites has been used in various industries such as construction, automotive, aerospace, energy, medical etc. for decades. These materials are known for their light-weight, flexibility, long durability, and enhanced mechanical strength.
- Composites are made up of two or more materials, hence recycling of these materials is a major concern. Most of the composites end up either in landfills or incineration plants after their useful product life.
- In order to enhance sustainability footprint of composites, hybrid or green approaches are ahead in development, depending upon the material used in polymer matrix and reinforcement.
- Green biocomposites are more sought after as they are made completely from biomaterials and few of them can biodegrade as well.
- However, biocomposites might lack the required mechanical strength and durability. In order to address the challenges of sustainable composites, many players are innovating new technologies with various combination of materials (renewable, recycled or biodegradable).
- Various organizations such as UK's National Composite Centre (NCC) and Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) are assisting companies in developing sustainable composites.

Aranca Report Overview

- In this report, Aranca has captured innovative and scalable technologies from the most promising entities in the domain of sustainable composites.
- Identified front runners in sustainable composites were evaluated using Aranca's 5 factor framework namely comprising of:
  - ✓ Intellectual property
  - ✓ Technology
  - ✓ Financial and market
  - ✓ Organization
  - ✓ Ecosystem
- The report consists of entities offering unique reinforcement material technology such as seaweed, spider silk, etc., in addition to conventional materials such as natural fibers.
- For any broader customized requirements, Aranca can also extend the study scope to provide support in:
  - ✓ Competition assessment
  - ✓ Market assessment and outlook
  - ✓ IP and commercial product landscapes
  - ✓ Route-to-market intelligence, e.g., key technologies, potential M&A targets, regulatory aspects, etc.

Note: This is one in the series of reports published on sustainability theme. Other reports such as Front Runners in **CO2 Utilization Technologies, Sustainable Materials, Sustainable Fuel Technologies** are also available.

CONCEPTS USED FOR MAPPING COMPANIES

Sustainable Polymer Composites

Polymer Matrix

- Petrochemical-based*: Epoxy, polypropylene, etc.
- Biopolymers: Polylactic acid, bio-polyethylene, etc.

**In case of petrochemical-based polymers, corresponding reinforcing material shall be of bio origin*

Reinforcing Material Source

- Fermentation: Spider silk, etc.
- Plant-based: Hemp, flax, etc.
- Marine-based: Seaweed, etc.
- Recycled: Plastics, carbon fibers, etc.
- Natural residues and waste: coconut fibers, rice husks, etc.

Sustainability

- Composite is either made of recyclable feedstock or is claimed to be recyclable
- Composite or its feedstock is biodegradable or compostable

Final Product Form

- Composites: Resins (granular, etc.), sheet, article or alike
- Fibers

REPORT OVERVIEW

39 companies actively working in sustainable composite technologies

Inclusion of hybrid and green biocomposites along with natural fiber manufacturers in a single platform

Holistic assessment in terms of IP, technology, financial, ecosystem and organization

Entities range from start-ups to potential disruptors*

In depth analysis and key observations for each entity

Information covered on each company

Company information

- Website, year of establishment, headquarters, key personnel, etc.
- Size (employee count, revenue, funding, etc.)
- Awards and recognition

Technology

- Technology readiness level (TRL)
- Feedstock, conversion process and output
- Patents and research collaborations

Commercialization

- Applications and markets
- Product details (form, chemistry, trade name, etc.)
- Business partnerships, investments

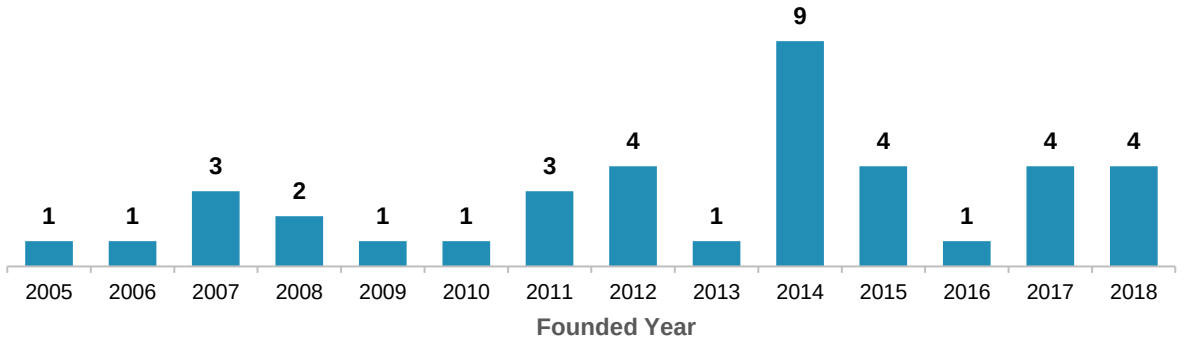
**Players with diversified business portfolio are excluded; Joint Venture and Partnerships, Established Players and Conglomerates shall be provided in a list format*

HIGHLIGHTS

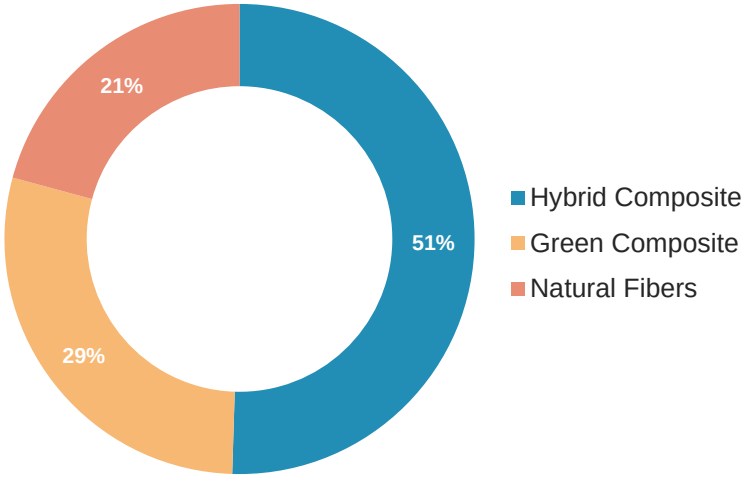
Summary

Companies covered	39
Geographic focus	Global
Year of establishment	2005 onwards
Type	Hybrid and green biocomposites

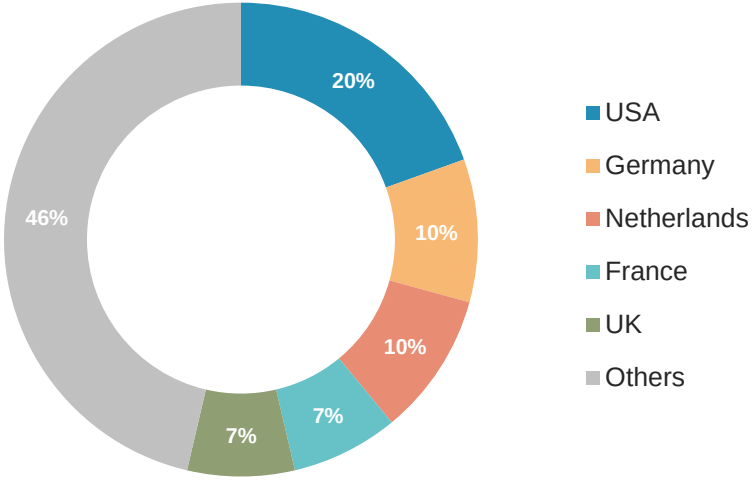
Companies By Maturity



Manufacturers by Product Type



Manufacturers by Origin



RESEARCH METHODOLOGY

Methodology

- A comprehensive search was performed on various platforms to map the relevant technology developers. Mapped entities were scrutinized for relevancy based on technology and product offerings.
- Focused secondary research was conducted for the relevant players in order to capture relevant information. In order to fill the gaps remaining after this, primary research was conducted wherever necessary.
- Entities with establishment year 2005 onwards have been considered, however, this has not been considered strictly in order to capture all significant players.
- Corporate players and entities with diversified portfolios having partial focus on sustainable composite materials were excluded.
- Each relevant player was evaluated on five important factors- intellectual property, technology, financials, ecosystem and organization (refer Aranca 5 Factor Framework on the next slide for more details).

Information Sources

Following paid and public sources of information were referred (not exhaustive):

- Commercial databases such as Factiva, Crunchbase, Pitchbook, Bloomberg, Euromonitor and EMIS
- Company websites, product brochures and news/media sections
- Industry associations and Government sources such as European composites industry association, Nova institute, Inside composites and AIMPLAS.
- Specific publications/magazines on sustainable composites
- Patents on databases such as Thomson Innovation and Questel Orbit
- Scientific literature published on databases such as ScienceDirect, Google scholar, RSC, ResearchGate, Scopus, SpringerLink and Wiley Online
- Aranca internal knowledgebases and industry experts

ARANCA 5 FACTOR ASSESSMENT FRAMEWORK

Factor	Parameter	Score (1−5); higher is better					Min	Max
Intellectual Property	No. of Patents						3	15
	Forward Citations							
	Patent Status							
Technology	Novelty						5	25
	Scope							
	Scalability							
	Competitiveness							
	TRL							
Financials	Total Funding						5	25
	Funding Rounds							
	Type of Investor							
	No. of Investors							
	Revenues							
Ecosystem	Target Industry Size						3	15
	Policies & Regulations							
	Environmental Impact							
Organization	Global Presence						4	20
	Employee Size							
	Active Years							
	Awards/Recognition							

Notes:

- Total score is obtained by adding the individual factor scores.
- For uniform representation, final score is normalized on a 0-100 scale and factor scores are adjusted accordingly.

CONTENTS

COMPANIES COVERED (EXAMPLES)

Fermentation-based

AMSilk

Plant-based

Bcomp

Natural Fibre Technologies

Marine-based

Helicoid Industries Inc

Recycled Materials

JIVA

Natural residues and waste based

ORINEO

malai

Others

Note: List shown above is for illustration purpose, total 39 companies shall be covered.

SAMPLE COMPANY PROFILE

Website: Link
Est.: 2011
HQ: Switzerland

Bcomp has developed a proprietary lightweight composite technology using **natural fibers of flax** as the **reinforcement**. **PowerRibs™** and **ampliTex™** are the key products which are applicable in automotive, furniture, sports and other sectors.

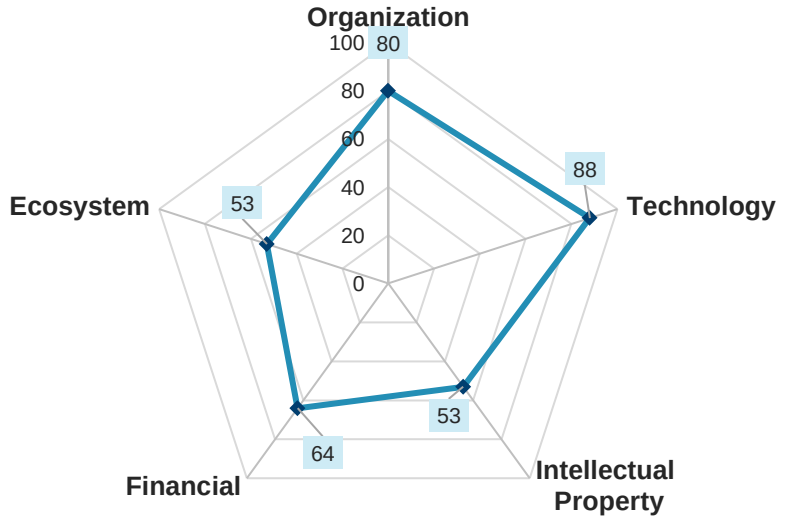
Technology
- Feedstock: Natural fiber, wood
- Process: Resin transfer moulding
- Key products: Reinforced prepegs and textile, composite
- TRL: Commercial application

Financials
- Total revenue: $ 1 to 10 mn
- Total invested amount: $ 3.2 mn
- Investors: Series A (Early stage venture)

Operations
- Commercial production facility under development at Fribourg, Switzerland

Applications
- Automotive
- Construction
- Space
- Sports

Aranca 5 Factor Assessment 70/100



Note: Scores have been normalized on a 0-100 scale. Detailed analysis has been provided in the next slide.

Aranca Observations
- Bcomp has come up with a potential lightweight composite technology applicable in various industries from automotive to space
- Bcomp also has a strong hold on technology with various ongoing projects

Overall Rating

SAMPLE COMPANY PROFILE

Bcomp

Aranca 5 Factor Assessment

Total Score **70**

		Criteria	Low 1	2	Score 3	4	High 5	Total
Intellectual Property	▪ IP portfolio of 5 patents, out of which 1 is granted	No. of Patents			3			8
		Citations/Year			3			
		Patent Status		2				
Technology	▪ Highly engineered fibre quality, thickness and twist ▪ Resin transfer moulding is applied to produce composites	Novelty			3			22
		Scope					5	
		Scalability					5	
		Competitiveness				4		
		TRL					5	
Financial	▪ Funding has been available in form of collaborations and seed investment	Total Funding				4		16
		Funding Rounds			3			
		Type of Investor				4		
		No. of Investors			3			
		Revenues		2				
Ecosystem	▪ Reduction in plastic with Flax fibers reinforcement resulting in durable lightweight parts	Target Industry Size		2				8
		Policies & Regulations			3			
		Environmental Impact			3			
Organization	▪ Around 50 employees ▪ Manufacturing facility in Switzerland	Global Presence			3			16
		Employee Size				4		
		Active Years				4		
		Awards/Recognition					5	

With technical partnerships and collaborations, Bcomp is in a good position to be a major active player providing lightweight composite solutions

Patents

- Bcomp has filed **five patents,** out of which one has been granted and the rest are in application state
- Patents mainly focus on **process of composite formation**
- Applications of the composite materials have also been disclosed in Bcomp's patents

Financial

- In **2017,** Bcomp received an investment of around **$3.1 mn**
- Initial funding was received in the year 2011 in the form of seed funds and grants

Research and Development

- Bcomp is focusing on developing solutions for mobility sector, specifically for motorsports, automotive interior and aerospace industries.

Collaborations and Partners

- Bcomp has a technical partnership with a touring car series, **DTM** and an electric vehicle manufacturer **Polestar**
- It has collaboration with **Volvo** for demonstrator XC60, in which parts were made of recycled ocean plastic along with natural fibers.
- Bcomp has a long-term partnership with **Tesla** for Electric GT World Series. It also has a collaboration with **Porsche** customer racing team.

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