



INDUSTRIAL COATINGS, HOT MELT ADHESIVES & CATHETERS: THE FUTURE IN BIO-BASED MATERIALS

European innovation at the heart of the Bio-based transition

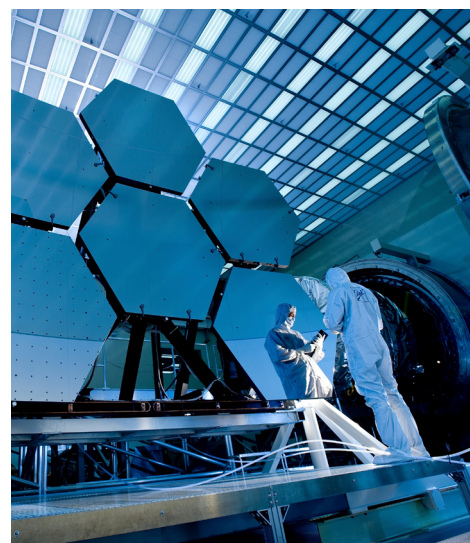
VIPRISCAR total grant : €2.8 Million
Partners involved : Tecnalia, B4 Plastics, Jowat, AEP polymers, Leitat, Cikautxo, Gaiker, Exergy & Vertech Group.
Vertech Group will lead the innovation's market research and exploitation plan.

Polycarbonates are used in practically every aspect of the daily life. The current, most widely adopted, manufacturing method uses bisphenol A (BPA) for the polymerization process. However, in recent year, negative effects from Bisphenol A on human health and on the environment, have been discovered and its use is now increasingly discouraged. Although the individual use and impact of BPA might appear to have little effects, it is the quantity and omnipresence of this material that poses a concern.

In this context, Isosorbide is a solution that arose during the search for alternative materials. This primary bio-based chemical obtained from corn-starch derived glucose will be able to replace BPA in the production of polycarbonates. This chemical compound has seen a significant growth over the past 10 years and it is expected to continue growing fast.

Nevertheless, the production methods of these bio-based chemicals however, have their own limitations, mainly the formation of toxic phenol as co-product. The current demand, but inefficient production method, led to high investments in research by Tecnalia, leading to the findings of isosorbide derived polycarbonates by melt polycondensation of Isosorbide bis(methyl carbonate) (IBMC) and 1,3-butanediol)[1].

VIPRISCAR is a EU project that received funding from the Bio-based Industries Joint Undertaking and that regroups 9 industry specialists to bring this technology to a lab scale production capacity. The proof of principle will be applied in 3 sectors. The 3 sectors are selected based on their use of polycarbonates or polyurethanes and their presence in the everyday life. The markets for each application are thoroughly analysed by Vertech Group. The following snapshots will give an image of the market evolution and of the potential that IBMC can represent for each of these industries: Industrial coating, Hot melt adhesives and Catheters.



¹ (Grand View Research, 2016).

² (Ochoa-Gómez, Gil-Río, Maestro-Madurga, Gómez-Jiménez-Aberasturi, & Río-Pérez, 2016)

1 INDUSTRIAL COATING: PREPARING FOR THE FUTURE

Industrial coating is a form of paint that is commonly applied on steel, metals or other industrial materials. The layer of coatings serves both a protective function and an aesthetical one. The final coating mix contains different components such as resins, pigments or solvents. The selection of the right coating mix will depend on the end use of the product. Most coating applications fall under architectural, industrial or special purpose segments. The focus of this research will consider the automotive and furniture industrial coatings section, due to their potential interest in bio-based, recyclable coatings and because of their changing environment that needs the accurate planning.

Market Influence

Electric vehicles

- No longer reserved for environmentalists only
- Research in autonomous cars shows that innovating coating will be used for improved automated vehicle detection

Environmental pressure :

- Awareness for waste reduction to protect the environment
- Circular economy business models will require higher quality and durability of coatings used.

Car sharing:

- Reducing the number of cars sold
- Increased usage time will require better quality coatings

Health and safety:

- Restriction in Volatile organic content level
- Opportunity for water-based coatings

Benchmark

Coatings © production is an established but continuously improvement process since the 20th century. The ability of bio-based polycarbonates to emit lower volatile organic compounds than the traditional resin materials makes them an increasingly researched coating materials. Likewise, low level of VOC, and high flexibility, makes polyurethane increasingly the standard material for industrial coating resin. Currently, the state-of-the-art industrial coating is isocyanate. However, exposure to the chemical compounds of isocyanate is hazardous and can lead to significant health problems. This is why safety precautions that need to be taken in order to produce polyurethane in a secure manner make the production process costly and slow.



 **Market size:**
\$70 BILLION
2017

 **CAGR:**
4.04%³
(2018 – 2023).

2 HOT MELT ADHESIVES: HOT TOPIC

Hot melt adhesives are the adhesives that become liquid when heated up to a certain point and solidify when cooled down. They are mainly used for industrial applications such as paper and cardboard, transportation or furniture. Different polymers are at the core of different types of hot melt adhesives. The alterations in copolymers make a certain product fit a specific application area.

Market Influence

Volatile commodities:

- Strong price increase worldwide for key adhesive commodities
- European price levels are dependent on global supply and demand structure

Individualization of society:

- European single-person households increase
- Increased consumption of disposable single use packaging

Environmental pressure:

- Paper and cardboard packaging leading recycling example
- Opportunity for increased quality and biodegradability of these materials

Benchmark

The adhesives makers market is highly consolidated, with the majority of the market share divided between 3M, Henkel and Dow Dupont. These companies are operating across the world and growing their position in each market over time through active merger and acquisition activities. In 2018 alone, Henkel acquired 3 new entities to strengthen their position in the Americas with investments in Peru, Chile and the USA.

Although these mergers or acquisitions are not necessarily directly related to the adhesive industry, it translates into a strategic market entry position for other business entities. Next to M&A activities, the multinationals in the adhesive market still invest, on average, about 2.5 – 5% of the total revenue on new research and development activities.

 **Total adhesives market size:**

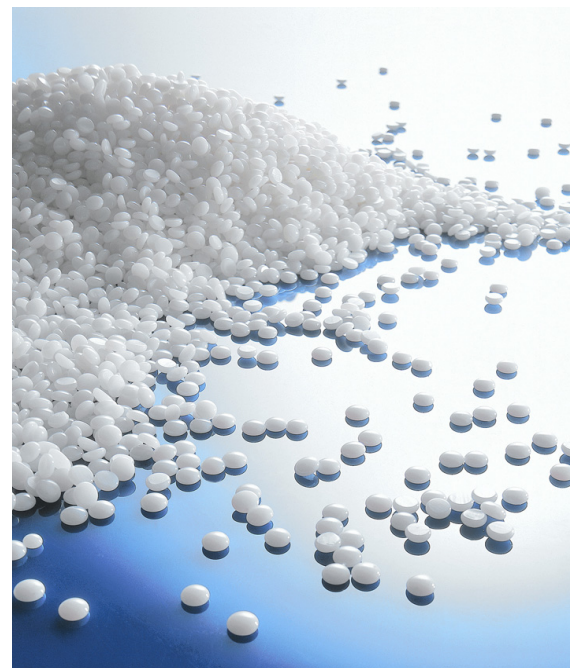
US\$ 16.2 BILLION

 **Paper and cardboard market share:**

20.3%

 **Paper and cardboard adhesives market value:**

US\$ 3.25 BILLION



3 CATHETERS: SUSTAINABILITY IN THE HEALTHCARE SECTOR

A catheter is a medical device in the form of a thin tube. The tube is inserted into the body to transport liquids such as medication, blood or urine in or out of the body. The type of material used for the catheter will depend on the purpose of use and on the amount of time the tube will remain connected. It is for example, common to have a urinary catheter temporarily after an operation. On the other hand, it might be necessary for a longer duration of time in case of more permanent complications.

Market Influence



Aging population:

- 64+ Population will represent 28% of European demographics by 2050
- Older age is a key risk factor for cardiovascular diseases



Single use plastic:

- European single use plastic legislation
- Anticipate single use plastic legislation in healthcare industry
- Anticipate change in plastic consumption in healthcare industry



Global catheter Market size:

US\$ 26.6 BILLION (2015)



Expected growth:

9.7% (2018 – 2021).

Benchmark

Catheters can be made from different materials, each one highlighting different advantages and drawbacks such as flexibility, biocompatibility and durability. The common materials include silicone, polyvinylchloride (PVC), nylon or polyurethane. The final selection of catheter material will depend on its purpose. Overall, there are 5 different application methods of catheters that will determine the choice in materials (Neurovascular, intravenous, urology, cardiovascular and specialty catheters).

Nowadays, the majority of polyurethane catheters are based on aromatic isocyanates because of their lower biocompatibility in comparison to polyurethane, based on aliphatic isocyanates. These materials are however toxic and prone, and they are prone to degradation. This toxicity is increasingly debated, and it is expected that there will be an incoming ban on the use of isocyanate in polyurethanes to produce catheters.





VERTECH GROUP is a multinational private support and property company that improves social and environmental activities, adopts the principles of the circular economy and increases profitability in a sustainable manner. As a strategic partner, the Vertech group helps clients define commercial and communication strategies that will accelerate the adoption of early innovation technologies in the market.

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