Welcome

Carbon fiber

Chemistry group presentation

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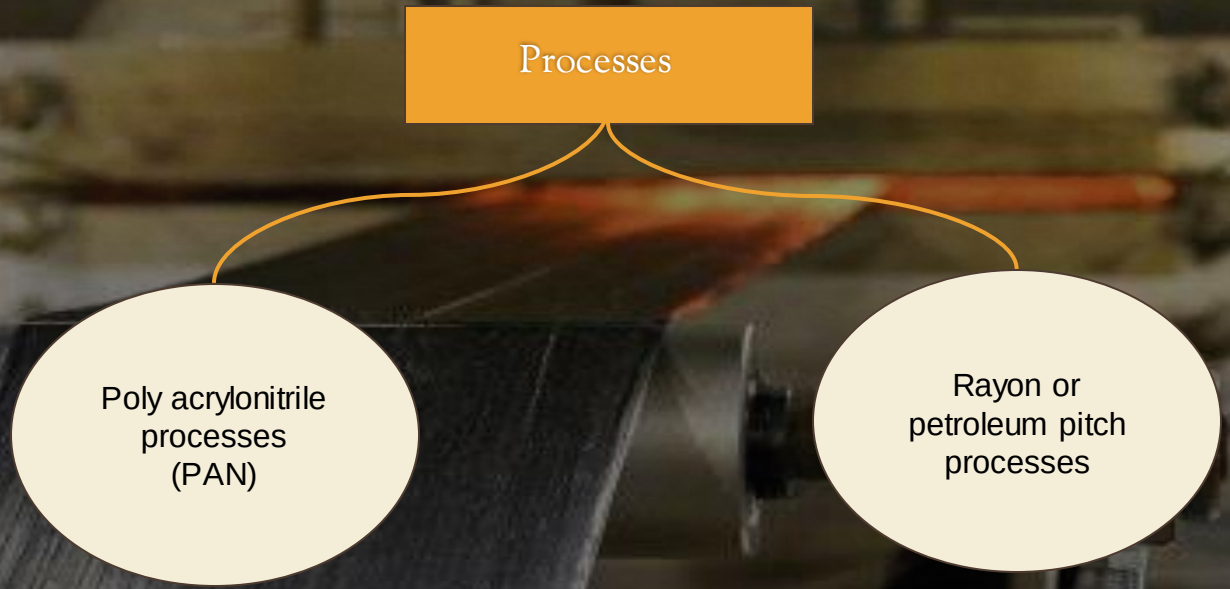
Introduction

What are carbon fibers?

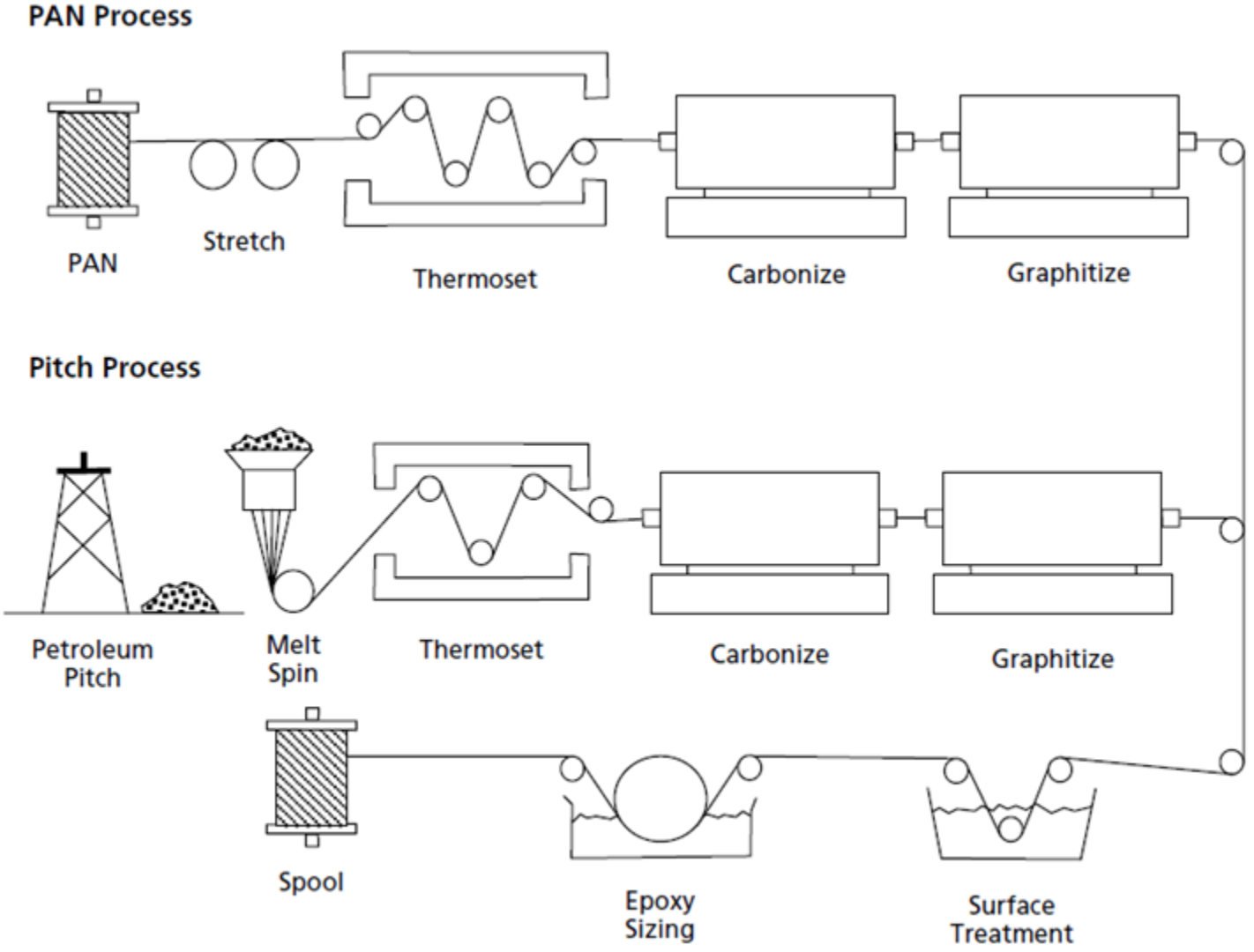
- Carbon fibre are fibres about 5-10 micrometres in diameter and composed Of at least 92% of carbon at oms.
- Carbon fibres were developed in the 1950s by heating strands of rayon until There are carbonized.
- In the early 1960s a process was developed using polyacrylonitrile as a raw Material.
- During the 1970s experimental work to find alternative raw materials l ed To the introduction of carbon fibres made from a petroleum pitch Derived from oil processing.

Picture sources-
Lamborghini.com

Carbon fiber is made from organic polymers
Mainly two types of processes used for making carbon fibre.



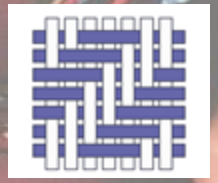
Picture source – MES inc



Picture source – Researchgate

Different types of weaves

- Plain weave



FORMED BY THE INTERWEAVING OF WARP AND WEFT YARNS

- Twill weave

SLASH LINE SHOWED ON THE WARP POINTS (OR WEFT POINTS) IS TWILL WEAVE

- Satin weave

INTERLACING OF WARP AND WEFT OCCURS ONLY EVERY FOUR OR MORE YARNS. INTERLACING POINTS ARE INDEPENDENT, DISCONTINUOUS AND EVENLY DISTRIBUTED

Picture sources-
Study.com

Description

Plain weave- it's a plain weave fabric which is some time preferred over 12 weave alternatives due to there easier to maintain weave aethestics when conforming to mold ths fabric holds an ultimate tensile strength of atleast 6010 ksi and provides strength in two direction. These properties makes it suitable for aircrafts and racing cars.

Twill weave- it is the most popular carbon fabric among the fabricators because of its incredible strength and stiffness for weigth performance but needs to be handled with more safety than plain weave

Harness satin weave- these weaves are less stable than other weave patterns .satin weaves laminates are much thicker compared to plain weaves laminates. It does not wrinkle easily compared with other fabrics hence the resulting material is stronger compared to many plain weave fabrics .

Picture sources-
Adobe stock

Properties

- Dimensionally stable –high stability when comes to dimensions
- Non poisonous –this property makes it useful in medical field
- Electrically conductive
- Fire resistant –as it is inert chemically it is not affected by fire (it can be used in making fire retardant jackets)
- Weight-light weight (this properties makes it useful in aerospace and aircrafts industry)
- High quality (fineness)
- Moisture regain

Etc.

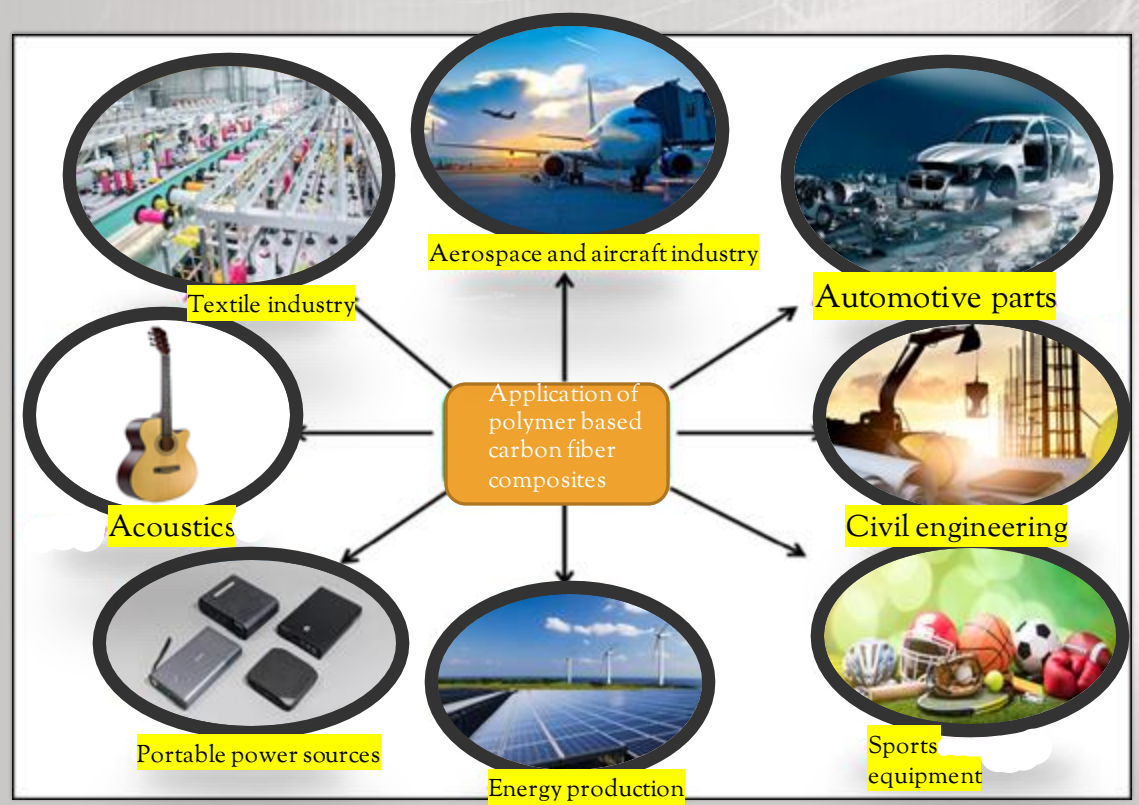
Picture sources- Adobe stock

Advantages

- High durability and compactness –long lasting fibers without being damaged.(withstand pressure, wear or damage)
- Featherweight-highly helpful advantage can be used in a lot of manufacturing industries such as racing cars and aircrafts.
- Imperviable-(corrosion resistant)
- Chemical inertness
- Low coefficient of thermal expansion

Picture sources-
Adobe stock

Applications



Medical

Military

Picture sources- Shutterstock.com

Safety measures

Small piece of fibers can flow at hand in the form of fine dust particles. Hence proper cleaning methods, like ejector cleaner should be used.

When using carbon fiber, do not rub or scratch off from skin. Carbon fiber strings are more likely metal wires and can quickly enter the skin. Instead use water and soap to clean it.

Carbon fiber needs to be stored properly. It should be stored in mild temperatures to avoid heating the material. Avoid direct sunlight or wet environments. etc.

Picture sources-
Adobe stock

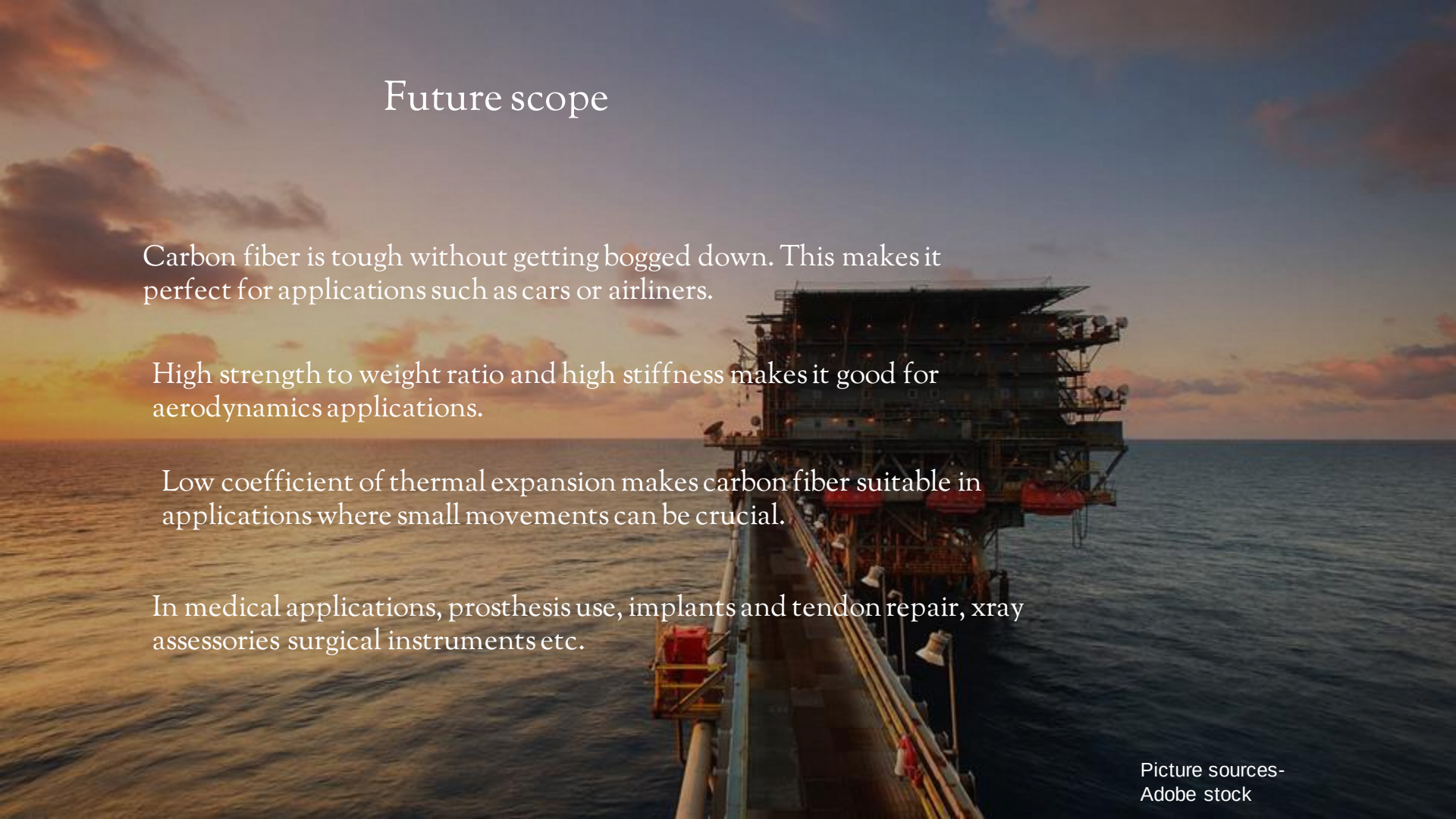
Future scope

Carbon fiber is tough without getting bogged down. This makes it perfect for applications such as cars or airliners.

High strength to weight ratio and high stiffness makes it good for aerodynamics applications.

Low coefficient of thermal expansion makes carbon fiber suitable in applications where small movements can be crucial.

In medical applications, prosthesis use, implants and tendon repair, xray assessories surgical instruments etc.



Picture sources-
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