



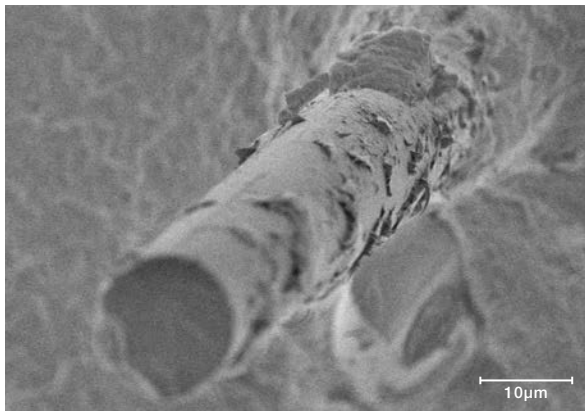
Adhesive Functions

Bonding Objects and Increasing Performance

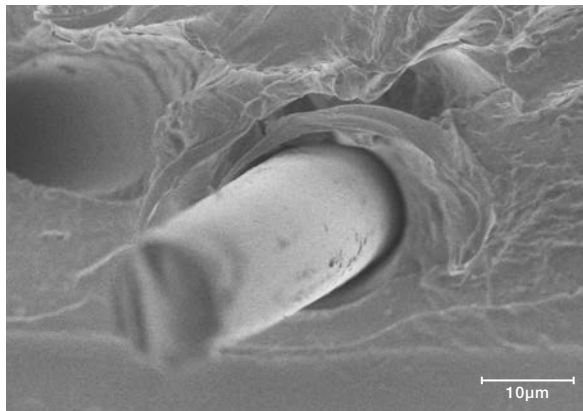
We often find ourselves in situations where we bond one object with another, such as bonding plastic model parts together or sticking a stamp on an envelope.

This article introduces our products that make it easier to bond objects that are usually incompatible.

■ Electronic microscope images of the conditions on an interface between glass fiber and PP



UMEX (1% by mass) added (adhesion between glass fiber and PP around it is improved by addition of UMEX)



No UMEX addition

From natural to synthetic adhesives

The function of “bonding” has been used to derive a desired performance or make a shape by bonding objects that do not naturally bond together. Although there are different methods such as use of mechanical fasteners and welding, the easiest method for us to imagine is adhesive bonding.

The history of adhesives is very old. Asphalt, a component of crude oil, was already used to bond shells or repair pots more than five thousand years ago. When we look around the world, natural adhesives such as pine tar, hide glue, and wax have been used for many years. It was only after entering the 19th century when synthetic adhesives, made from coal or petroleum, were invented. They appeared with the increasing need for adhesives with higher function and the developments in science and technology that enabled them. With the development of polymer chemistry in the middle of the 20th century and later, various synthetic compounds have been developed, and the performance of adhesives has improved dramatically.

While adhesives become solid after bonding, pressure sensitive adhesives undergo no such change. It is therefore possible to peel off after bonding things together.

A wide range of use in industry and the medical field

At present, many manufacturers produce and distribute adhesives, which are then used in various different industries and fields.

For example, bags for snacks and frozen food have different requirements, including preservation and tear strength. Nevertheless, they are both bonded with adhesives. Artificial kidneys used in dialysis are made by bundling approximately 10,000 hollow fibers at both ends and affixing them to a plastic cylinder with an adhesive. Surgical tape, which is used to affix a bandage to the affected part when we suffer an injury, also contains an adhesive.

In the recent years, adhesives have also contributed to weight reduction and assembly rate acceleration, as high-strength adhesives replace mechanical fasteners.

Making incompatible materials easier to bond

This section introduces products that are additives, which improve bond strength, even though they are not adhesives themselves. A typical such product is a modifier, which facilitates the bonding of polyolefins such as polyethylene or polypropylene (PP), which are not compatible with other materials if they are used alone.

The ‘UMEX’ product line, manufactured by

Sanyo Chemical, is a series of polyolefin-based resin modifiers. They are used as adhesive modifiers. ‘UMEX,’ which contains both a hydrophobic polyolefin part and a hydrophilic part, functions like a surfactant. It is therefore used in various applications where it acts as a modifier of surfaces or material interfaces. For example, the bumpers of a car are usually made of polypropylene, and they are painted with the same paint as the steel body. To make this possible the bumpers must first be coated with a primer that is compatible with both the PP and the paint. ‘UMEX’ is used as a raw material for this primer. Another application is fiber reinforced plastic, which is made by dispersing glass fiber in polypropylene, which is used in things like the cowling that covers the engine of a motorcycle. Without anything added, the glass fiber does not reinforce the plastic because the adhesion between the glass fiber and polypropylene is weak. By adding ‘UMEX,’ the glass bonds well to the polypropylene and strength is improved. Another application is composite materials

made by adding wood chips to polypropylene. This permits waste recycling as they are turned into wood decks and benches. Its field of application is expanding even to that of polymer alloys, where new resins with unprecedented functions are created.

We also have in our lineup the ‘CHEMIOX’ Series, which are adhesive enhancers to improve the adhesion between the coating that protects the vehicle body from rusting, gravel, etc., and the steel plate. We have our ‘UCOAT’ Series, which improve the adhesion of aqueous coating and is environmentally friendly and safe for the workers.

The technology of “bonding” is attracting attention from various different fields. New bonding includes combinations of materials whose performance had been previously unachievable. Sanyo Chemical will contribute to adding value to our customers’ products by lining up various functions, such as improvements in adhesive properties, interfacial adhesion, and adhesives themselves.

■ Major adhesives, resin modifiers, and adhesiveness improvers by our company

Classification	Product name	Main applications	Outline
Adhesive	UNOFLEX Series	Adhesives for food packaging films (aluminum deposition film, etc.)	One pack moisture curing type polyurethane resin. Excels in adhesive strength. Easier to handle than two-pack types.
	POLYMEDICA Series	Potting agent for hollow fiber artificial kidney used for dialysis, hollow fiber water purifiers, etc.	Two-pack curing polyurethane resin. Has a low viscosity when the two parts are mixed and is suited to potting.
	POLYTHICK Series	Various adhesives (surgical tape, insulating tape, surface protection sheet, envelope sealing tape, adhesive sheets for automobile interiors, etc.)	Acrylic ester-based. All types from low adhesion to high adhesion are lined up. Excels in transparency, weather resistance, and heat resistance.
Resin modifier, adhesiveness improver	UMEX Series	Polyolefin modifier (coating on automobiles and electronic parts, FRP, synthetic wood, polymer alloy, etc.)	Acid-modified low molecular weight polypropylene-based resin. Effective in improving adhesiveness of polyolefins to other materials (paints, fillers such as glass fiber, and other polymers).
	CHEMIOX Series	Adhesiveness improver for rust prevention (chipping prevention) coating on automobiles. Precoated metals for household appliances, etc.	Two-pack curing blocked polyurethane resin. Easy handling, including care-free pot life.
	UCOAT Series	Adhesiveness improver for aqueous coating	Polyurethane resin emulsion. Forms a film that excels in flexibility, chemical resistance, and adhesion. Also has favorable water resistance as it contains no surfactants.