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Sanyo Chemical Industries, Ltd.

Development of innovative resin modifier to increase hydrophilicity of Polyolefin surface imparting proper coating ability& adhesiveness

Sanyo Chemical Industries, Ltd. (Head office: Higashiyama-ku, Kyoto City; President: Takao Ando) has newly developed innovative resin modifier; MEL-AQUA 350L*. MEL-AQUA 350L makes possible to increase hydrophilicity of surfaces of polyolefins such as polypropylene and polyethylene. It can improve the coating ability and adhesiveness of polyolefins when only kneaded into them without any surface treatment.

*laboratory prototype for preproduction

【Background of the development】

Polyolefins are used extensively due to their excellent processing of molding and chemical resistance as well as their light weight and low price. However, their non-polar and hydrophobic surface properties lead poor wettability (hydrophilicity) to coating materials and adhesion so that they are difficult to coat and adhere.

Therefore surface treatments by plasma, flame or corona are generally required to improve the surface hydrophilicity of polyolefins and then primer is applied and dried before coating or adhering to them. Surface treatments need special equipment and sufficient consideration for safety. Also they are costly in terms of processing time and labor costs. Further, the effect of such treatment subsides within short time so that treated resins must be moved immediately to the following step such as coating.

We have developed the innovative resin modifier; MEL-AQUA 350L that can give sustainable hydrophilicity to polyolefins by simply kneading to the resins and without surface treatments.

We had developed high-performance resin modifiers such as permanent antistatic agents; PELESTAT and PELECTRON products, and modifiers for polyolefins; UMEX Products as filler or pigment dispersants as well as compatibilizer to various resins. We took advantage of the knowledge of these developments for the development of MEL-AQUA 350L.

【Abstract of the technology】

MEL-AQUA 350L is a polymer having hydrophobic segment with high affinity to polyolefins and hydrophilic segment. Taking our expertise “how to localize the polymer around the surface of polyolefins after kneading“, we succeeded in developing MEL-AQUA 350L.

When approx.10 wt% of MEL-AQUA 350L is kneaded with polyolefins, its hydrophilic segment migrates to the surface of resins. MEL-AQUA 350L is the innovative resin modifier whose localized hydrophilic segment works to increase the hydrophilicity of the polyolefin surface, and improve the coating ability and adhesiveness of the resins. There was no modifier with such a performance.

On the other hand, low-molecular surfactants also have hydrophobic segment and hydrophilic

segment in the molecules, but they bleed out from the resins. Unlike such low-molecular surfactants, MEL-AQUA 350L maintains long lasting effect of providing hydrophilicity. In addition, there is no greater impact on physical properties of resins such as heat resistance and mechanical strength by MEL-AQUA 350L.

The molded resin having MEL-AQUA 350L kneaded does not need the surface treatment. Therefore it make possible to reduce the equipment, processing time and labor costs. It also enhances process flexibility since the temporal limitation is eliminated because of its long-lasting effectiveness.

Further, if the surface treatment and MEL-AQUA 350 L apply together, it is capable of achieving greater coating and adhesion performance than possible in the past. Such polyolefins are also expected to broaden their applications that have never been feasible before.

【Example of Application】

MEL-AQUA 350L is especially effective for injection molding polyolefins, particularly polypropylene. Depending on the application, not only surface treatments but also the primer process could be omitted.

MEL-AQUA 350L can improve adhering, coating and printing abilities of polyolefins with different materials. It can be expected to broaden the versatile polyolefins' applications further by giving more useful combination, higher functionality and aesthetic exterior to the resins. Especially, in the field of transportation such as automobiles where lighter weight is required, the application of polyolefins for automobile interiors is expanding. Also switching from solvent-based paint to waterborne paint is being promoted in the aspect of reducing environment impact. In such a circumstance, needs for MEL-AQUA 350L are increasing.

【Feature Plan】

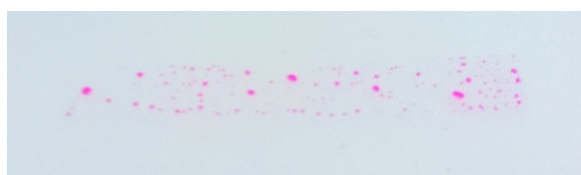
We are now carrying out sample work for injection molding polypropylene to each customer, and have confirmed that there was no practical problem with moldability. We will approach to a wide range of applications including automobile interior parts, and strive for commercialization by 2020.

Besides, we aim to expand applications other than injection molding polyolefins to the ones in fiber, film and sheet type. We will further advance to impart new functions such as anti-fogging and a self-cleaning and expand the line-up of MEL-AQUA to meet various needs.

-Reference-

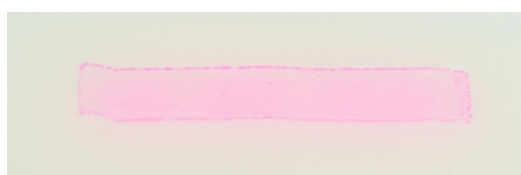
Wettability performance test of the injection molding surface of polypropylene

Without MEL-AQUA 350L



Wettability poor

With 10wt % of MEL-AQUA 350L



Wettability good

※ Both wetting tests were conducted with wetting tension testing pens of 38mN/m.