

Protecting PET Bottles

With its worldwide patented Plasma Impulse Chemical Vapor Deposition (PICVD) process, SCHOTT HiCotec has achieved a major breakthrough in **barrier coatings** for plastic packaging. In collaboration with SIG Corpoplast, coating plants will now be built that will enable an economic mass production of coated PET bottles.

► As you can see from today's advertisements or from looking around the supermarket, more and more beverages and foods are being supplied in plastic packaging – mainly because they are lighter and more resistant to breaking than traditional glass containers. In particular, the amount of PET beverage bottles is steadily increasing. To ensure that the quality of the packaged mineral water, fruit juice or beer remains the same over the shelf life of the product, the PET bottles are given a barrier coating that prevents the ingress of oxygen and egress of carbon dioxide.

All requirements of the beverage industry are fulfilled

The worldwide patented PICVD technology from SCHOTT offers an ideal solution for these barrier coatings. The extremely thin and well bonding layers made of glass-like silicon dioxide (SiO_2) can thus be realized rapidly and economically. This is possible primarily because of the pulsing of the plasma, which leads to homogeneous and dense layers at low processing tempera-



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Using a process patented by SCHOTT, PET beverage bottles are coated with a SiO₂ layer that keeps the contents fresh for months – just like glass bottles.

tures. It also allows the combination of several different layers in a single processing run (see also SCHOTT Info No. 103).

A typical multilayer system for PET bottles consists of an adhesion layer and the barrier coating. The adhesion layer ensures that the barrier coating does not detach from the surface and is resilient. In this way, for example, a coated PET bottle can withstand a fall from a height of two meters without damage. A barrier coating made of silicon oxide significantly reduces the diffusion rate of gases compared with non-coated bottles. In order to increase shelf life the barrier effect can be up to ten times higher for oxygen and seven times higher for carbon dioxide after "load." This load may be carbonation or hot filling, both of which cause deformation of the PET, often referred to as creep. Thus the requirements of the beverage industry will be met. The shelf-life time of products like fruit juice, mineral water and beer packaged in coated PET bottles will be increased and quality maintained over months.

Inside coating offers advantages

With PICVD technology, PET bottles can generally be coated on the inside or the outside, but the inside coating has many advantages. First, an inside coating cannot be damaged in handling or transport. Second, the contents of the bottle only come in contact with the glass-like silicon dioxide coating, and not with the PET, which has benefits for some oxygen sensitive products. And third, the processing chamber is not coated. This reduces the need to clean the chamber and thus lowers maintenance costs.

To integrate the PICVD coating technology into the economic mass production of PET bottles, SCHOTT HiCotec has been working in close collaboration with SIG Corpoplast GmbH since September 2001. In recent months, the two companies have jointly built a novel production plant in which PET bottles are coated. With this facility, known as "Plasmax 12D," 10,000 PET bottles can be coated per hour. For this development, the expertise of SCHOTT HiCotec in commercial-scale PICVD coating technology (for example, for cold-light reflectors and phar-

"SCHOTT PI COATING"

Excellent properties for a wide variety of packaging applications:

- transparent
- completely recyclable
- SiO₂ safe for foodstuffs
- high gas barrier
- does not affect taste
- chemically resistant

Plastic packaging for:

- beverages
- chemicals
- cosmetics
- detergents
- food
- pharmaceuticals

maceutical vials) was coupled with the experience of SIG Corpoplast in the construction of stretch blow molding machines for PET bottles.

The first plant has already been supplied

SIG Corpoplast is responsible for the marketing, after-sales services and maintenance of the new facilities. SCHOTT HiCotec will supply the PICVD units for the beverage and food industries exclusively to SIG Corpoplast. The first machine was delivered to the lead customer in the spring of 2003. Two further plant sales are planned this year. Market prospects are very good. Improved barrier properties and extended shelf-life time are predicted to increase the market share of PET bottles in the food and beverage industries substantially – at the expense of other materials such as glass and metal. ◀

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