

Superior Results Through Concerted Efforts

Man's utilization of the material glass goes back more than 5000 or 6000 years – and yet this most astonishing of materials is still offering an enormous wealth of innovative potential which we're only just beginning to discover.

Within the scope of a High-Tech-Offensive (HTO) initiated by the Federal State of Bavaria, four companies have made it their goal to manufacture a variety of glass products in an effort to study and research at least a fraction of the untapped potential in glass.

“Composites and surface-refined glass products” (“Werkstoffverbunde und oberflächenveredelte Produkte aus Glas”) – WOPAG for short – is the acronym used to christen this project which involves Wiegand & Söhne GmbH & Co. KG, manufacturers of glass container products, beverage bottles, and packaging, and Flabeg GmbH, processor of floatglass for a wide variety of applications. The quartet is completed by Nachtmann GmbH, a manufacturer specialized in domestic glass products, particularly lead crystal for drinking vessels and gift articles, and Mitterteich-based Schott-Rohrglas GmbH, leading manufacturer of tubes, capillaries and bars made of special glass for the pharmaceutical and chemical industries, the solar heating industry, and for a wide variety of technical applications.

A Cooperation Between Industry and Science

“We were very lucky to win over Bayreuth State University's Department for Applied Natural Sciences as our scientific partner, which will be participating with no less than seven chairs”, said Dr. Fritz-Dieter Doenitz, Director of Research & Development at Schott-Rohrglas. The objectives of this five year project include the development of composites of glass and other materials such as ceramics, metals and resin, which will open up a host of new



To increase energy yields, Schott-Rohrglas plans to develop improved anti-reflection coatings for tube collectors (above) and parabolic troughs (below).



applications due to their characteristic properties. A further goal is the creation of functional coatings on glass which will improve mechanical, optical, corrosive or electrical properties. “Progress depends on the mastery of basic

material-science phenomena which are very relevant to practical applications such as ageing, adhesion or interfaces. It is especially in this sector where we are looking forward to an intense cooperation with the Bayreuth

scientists," Doenitz says. The result should lead to economical and environment-friendly solutions suitable for series production.

List of Stringent Criteria

WOPAG has some 10 million euros at its disposal, Schott being the largest contributor with 4.35 million euros. Selection of the various projects was subjected to a list of stringent criteria. The declared cornerstones were the project's consequences on research and technology politics, its network concept on a state level, employment and job-creation relevance, and its cost-benefit-ratio. "WOPAG more than excels on all accounts," claims Hans Spitzner, Secretary of State of the Bavarian State Department for Economics, Traffic and Technology. "In spite of their long history, glass and ceramics are anything but yesteryear's materials, they are the materials of the future."

Focus on Solar Energy

The main focus of Schott's research and development activities centers on the utilization of environment-friendly solar energy. "We are working on components for tube collectors and parabolic trough technology, the key components of solar heating and power stations," explains Dr. Stephan Tratzky, WOPAG project manager at Schott.

Currently, the jackets enveloping the Borosilicate glass collectors reflect about 8 percent of incoming light. With an antireflective coating, our rate is to be halved, increasing energy yields. Also in development is a jointing technology based on a melting on process

Architecture is yet another field where special glass tubes can provide interesting design possibilities, especially if equipped with anti-soiling coatings as shown here.

designed to achieve a solid thermal and mechanical fusion of the glass and steel tubes. Another way to intensify solar power absorption is through "absorption layers" which remain stable under extraordinary thermal strain of up to 300 °C.

Compelling Ideas for Glass in Architecture

Architecture also opens up entirely new prospects for applications with glass. Innovative materials include state-of-the-art safety glass tubes featuring increased impact and pressure resistance in the form of glass-glass-compounds, accessible glass pane elements with in-between tube segments in sandwich construction, and lightweight, pressure-resistant compound materials made of ceramic and silicate materials with interior glass tube reinforcement. "We also plan on working on the development of anti-soiling and self-cleaning exterior coatings for glass tubes and glass bars for use in prestigious building facades," says Tratzky ■

Project Partners of Equal Status

These landmark ideas require a thorough understanding and mastery of the basic chemical and physical processes occurring both on the glass surface, like the adhesion of coatings to glass, and between glass and other materials. This is the point where the interests of all four of the involved companies converge, and where the scientific competence of Bayreuth University is expected to provide the required support. "Rather than conducting bilateral, order-related project research, we are pursuing a joint concept involving five equal partners," says Prof. Dieter Brüggemann, coordinator of the university's WOPAG project, of this whole new approach in German industry. Since the companies involved are not competing with each other, they will be providing their know-how to each other without limitations or restrictions, which avoids parallel developments and saves time and money. "This level of complete openness is a vital element to our project," claims Jürgen Strabel, Managing Director of Research & Development at Schott-Rohrglas.

