Developing a “Green” Binder for Stone Wool

How can we make our products more sustainable? It’s a question most large companies are facing nowadays. When Rockwool Group, the world’s leading manufacturer of stone wool insulation, wanted to find a sustainable glue for binding stone wool fibers, researchers used X-ray technology to help the company better understand its products.

Stone wool (also called “rock wool”) is rock-based mineral fiber insulation made of basalt rock and recycled slag. It is used in buildings for HVAC (heating, ventilation and air conditioning), acoustic insulation and passive fire insulation. To make stone wool, the minerals are melted and spun into fibers, and as the fibers are spun a binder is added to ensure optimum strength and durability. The binder must be able to withstand changes in wind, weather and temperature.

Currently, Rockwool uses a standard phenol resin as a binder. But while this resin is very durable, it is a petroleum derivative, and Rockwool wanted to know whether the glue could be derived from more sustainable sources.

A biological, biodegradable binder based on gelatin was considered, but it would have to be as strong, durable and weatherproof as its predecessor, so a more in-depth understanding of it was needed.

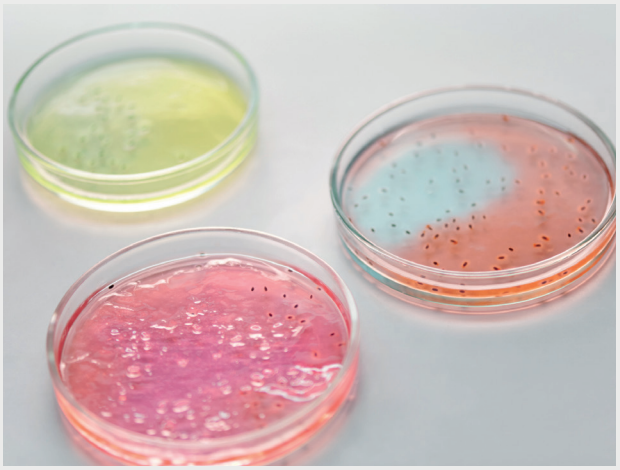
To gain better insight into the proposed new binder, the LINX Association facilitated contact between Rockwool and the University of Copenhagen (KU). KU provided access to a technique called small-angle X-ray scattering (SAXS), in which X-rays can be used to reveal molecular structure, functioning like an extremely advanced microscope.

Finding Potential in Sustainable Materials

The technique enabled researchers to look deep into the binder without destroying it or taking it apart. SAXS provided detailed information on the gelatin’s molecular composition, spotlighting “meshes” in its molecular network.

It also made possible the examination of the binder’s durability in strength and temperature trials, and even offered the option of creating real-time recordings that illustrated how stone wool fibers harden and come together.

Aided by small-angle X-ray scattering’s ability to reveal processes in detail, researchers can steer development in directions that reduce excess cost.



A sustainable glue able to bind rock wool fibers together is derived from gelatin (a by-product of pork production).

Using X-rays, researchers can examine and formulate new kinds of glue by assessing sample glues’ behavior and durability.

The deeper a company’s knowledge of its products, the better able it is to avoid potential problems, such as issues of durability. Techniques that employ X-rays have demonstrated their power to gather the kinds of information that are essential to product development. The result is a recipe for better and more durable products, improved documentation and greater customer satisfaction.

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