

"My Music-Loving Days as a Student Live On in My Acoustic Research"

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Materials that manipulate sound

Fumito Takeuchi is taking action to solve the problem of the noise that pervades the world. He is combining nonwovens, polyurethane, polyolefin rubber, and other materials in which Mitsui Chemicals has competitive edge to offer optimal sound control solutions. What are the current challenges for this researcher, who is music lover, to deliver brand new value to the world?

Fumito Takeuchi winds the key on a metal music box and places it on the desk. Its high-pitched chiming reverberates through the room. It's considerably harsh to the ear.

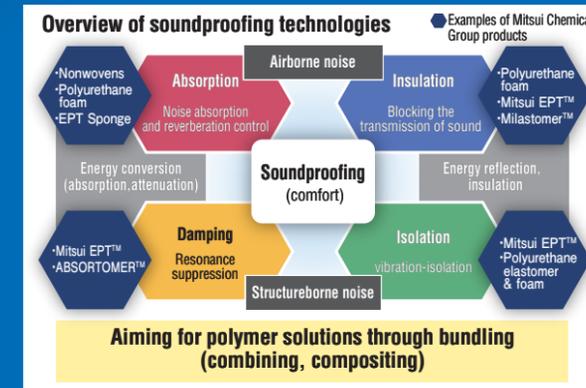
"What would you do if this sound is too much? Normally, you would close the lid," he says. The leader of research into acoustic materials, Takeuchi covers the music box with a container shaped like a temple bell. However, there is nearly no change in the grating sound. So Takeuchi pulls out a sheet and spreads it beneath the music box. Its sound is immediately softened, becoming barely audible.

"The music box was striking the desk, creating vibrations that caused sound. This is called structureborne noise. Vibration-isolation by spreading a rubber sheet so that vibrations aren't transmitted to the desk is effective as a soundproofing measure," says Takeuchi, explaining his experiments into sound. He notes that he often performs such experiments when visiting customers for the first time. This is because hearing the actual change in sound best helps people understand the essence of sound countermeasures.

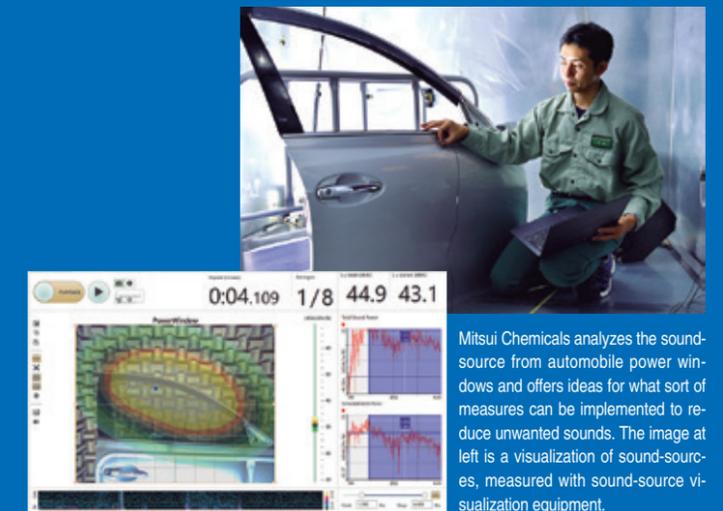
Creating new value through bundling

Mitsui Chemicals started research on the theme of acoustics three years ago. Until then, the company had developed individual applications such as sound absorbing

Soundproofing solutions offered by Mitsui Chemicals



Soundproofing measures call for the analysis of how sound transmits and the setting of countermeasures. Sound absorption and insulation are effective against airborne noise, while damping and vibration isolation are effective against structureborne noise. Mitsui Chemicals has material technology suited to sound absorption, insulation, damping, and vibration isolation, and offers even more effective soundproofing solutions by combining these.



Mitsui Chemicals analyzes the sound-source from automobile power windows and offers ideas for what sort of measures can be implemented to reduce unwanted sounds. The image at left is a visualization of sound-sources, measured with sound-source visualization equipment.

materials made with nonwovens or polyurethane foam, and vibration-isolation materials made with polyolefin rubber. However, Takeuchi wondered whether the company could bundle such materials to offer better solutions for the acoustic management.

He first set his sights on the automotive field.

"In the past, the polyurethane team had individually proposed polyurethanes to customers, and the nonwovens team had done the same with polyurethane team. In fact, though, combining polyurethane foam with nonwovens creates an excellent sound absorbing material. By bundling materials, we plan to offer higher performance and new value," explains Takeuchi about the company's strategy.

In 2015, the company established an acoustics testing room and began full-scale research into noise countermeasure technologies. As an example, the company analyzes the sound-source from automobile power windows and offers ideas for what sort of measures, implemented in what parts, can reduce unwanted sounds.

Recently, it undertook noise muffling measures for institutional dishwashers, at the request of the Yoshinoya restaurant chain. The shop had considered the install of a conveyor-type dishwasher with attached robotic arm to deal with a personnel shortage, but the noise from the system

made it difficult for staff to hear orders.

"We measured the noise level at 85 decibels. The restaurant asked us to lower this to 75 decibels within two months. So we quickly analyzed the noise generated by the dishwasher, and worked to design a soundproof cover," says Takeuchi. Mitsui Chemicals designed the soundproof panel and fitted the backs of the dish entry and exit panels with nonwovens to absorb the noise, and attached sound insulating curtains made from foamed polyethylene sheets with a three-layer structure. As a result, the company succeeded in lowering the noise level below the target 75 decibels within the time limit.

The truth lies within dialogs with customers

Why did Takeuchi launch the acoustics solutions business?

"After I joined the company in 2001, I was involved in the development of two new products until I moved to the research de-

partment for the core product EPT (ethylene-propylene-terpolymer) in 2013. These were an adhesive for LCD panels, and sealing sheets for photovoltaic cells. In both cases, I talked with customers and felt motivated by the work of creating something that didn't exist. That's why I wondered whether there wasn't something new we could do with EPT, and hit upon the idea of using it for sound management."

Takeuchi is a dedicated music fan. In his student days, he immersed himself in band activities.

"After a number of detours, I'm happy that I've settled into work that involves sound. In the future, I want to tackle not only countermeasures for unwanted sounds but also the creation of comfortable sounds, and one step ahead, the creation of comfortable spaces," he explains. Flying around the country and interacting with customers day to day, Takeuchi can be viewed as setting a new style for researchers. 

Creating spaces where children can spend time at ease

Mitsui Chemicals is working with universities on proof-of-concept testing to install nonwoven sound-absorbing material in the walls and ceilings of kindergarten rooms, an effort that has yielded results. Confirmed effects include more relaxed behavior among children and reduced stress in their caregivers, thanks to improved ease of hearing voices. This is expected to aid in the creation of environments where children can spend time at ease.