

# A research breakthrough toward odor-generating TV

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An electrical current is sent through the lead wires to heat an aqueous solution. The heat builds pressure, causing a tiny hole in an elastomer to open, releasing the odor, which is measured by the detector.

(PhysOrg.com) -- Today's television programs are designed to trigger your emotions and your mind through your senses of sound and sight. But what if they could trigger a few more? What if you could smell or taste the cheesy slices of pizza being eaten by your favorite characters on TV? Is it possible? Would audiences enjoy the experience? Would advertisers jump on the opportunity to reach consumers in a new way?

These questions formed the basis of a two year experiment by researchers at the University of California, San Diego, conducted in collaboration with Samsung Advanced Institute of Technology (SAIT) in Korea. In a proof of concept paper published online today by the journal

Angewandte Chemie, the researchers demonstrate that it is possible to generate odor, at will, in a compact device small enough to fit on the back of your TV with potentially thousands of odors.

"For example, if people are eating pizza, the viewer smells pizza coming from a TV or cell phone," said Sungho Jin, professor in the departments of Mechanical and Aerospace Engineering and NanoEngineering at the UC San Diego Jacobs School of Engineering. "And if a beautiful lady walks by, they smell perfume. Instantaneously generated fragrances or odors would match the scene shown on a TV or cell phone, and that's the idea."



(L-R): Grad students Calvin Gardner and Hyunsu Kim measure the electrical properties of heater wire actuators while detecting the odor released.

Jin and his team of graduate students used an X-Y matrix system in order to minimize the amount of circuitry that would be required to produce a compact device that could generate any odor at any time. The scent comes from an aqueous solution such as ammonia, which forms an odorous gas when heated through a thin metal wire by an electrical current. The solution is kept in a compartment made of non-toxic, non-flammable silicone elastomer. As the heat and odor pressure build, a tiny compressed hole in the elastomer is opened, releasing the odor.

Whether TV and cell phone audiences and advertisers will respond to such idea are questions for another phase of the study. For now, the question was simply whether it's possible.

"It is quite doable," said Jin, who is also a world renowned researcher in materials science.

Without an X-Y matrix system, thousands of individual controllers would be needed to accommodate the range of odors required for a commercial system. "That's a lot of circuitry and wires," said Jin. By comparison, using the X-Y system, 200 controllers (100 on the X-axis multiplied by 100 on the Y- axis) would selectively activate each of the 10,000 odors.

The UCSD team tested their device with two commercially available perfumes, "Live by Jennifer Lopez," and "Passion by Elizabeth Taylor." In both cases, a human tester was able to smell and distinguish the scents within 30 centimeters of the test chamber. When the perfumes were switched, the tester was exposed to coffee beans, which is the common practice for cleansing a tester's sense of smell in perfume development.

"This is likely to be the next generation TV or [cell phone](#) that produces odors to match the images you see on the screen." said Jin. The multi-odor concept was initiated by Samsung's research and development group, headed by Jongmin Kim at SAIT. They came to UCSD with a request for a practical means of accomplishing such a vision.

The possible scenarios are endless. A romantic comedy opens with two harried people stopping by their favorite coffee shop to fuel up before work. They are about to meet in some impossibly adorable way. But you're too distracted by the hazelnut latte that looks so good you think you can smell it. And you can. Thanks to the compact odor-generating device attached to the back of your TV set. Unless the scent is fading, in

which case you just need to buy a new one like you would to replace the ink cartridge on your printer.

Next steps in the research would include developing a prototype and demonstrating that it is reliable enough to release odors on cue and scalable to the size needed for consumer electronics like TVs and cell phones. And there are a few other considerations. For example, perfume companies could let you sample new scents through TV, but your TV's odor-generating device would have to carry that particular perfume meaning the device probably needs to be upgradable like software for your home computer. And TV producers will probably want scents that are tailored to match the personalities of their characters.

"That's a logistics problem," said Jin. "But in specific applications one can always think of a way."

Provided by University of California - San Diego

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