Improving cyber security in harsh environments

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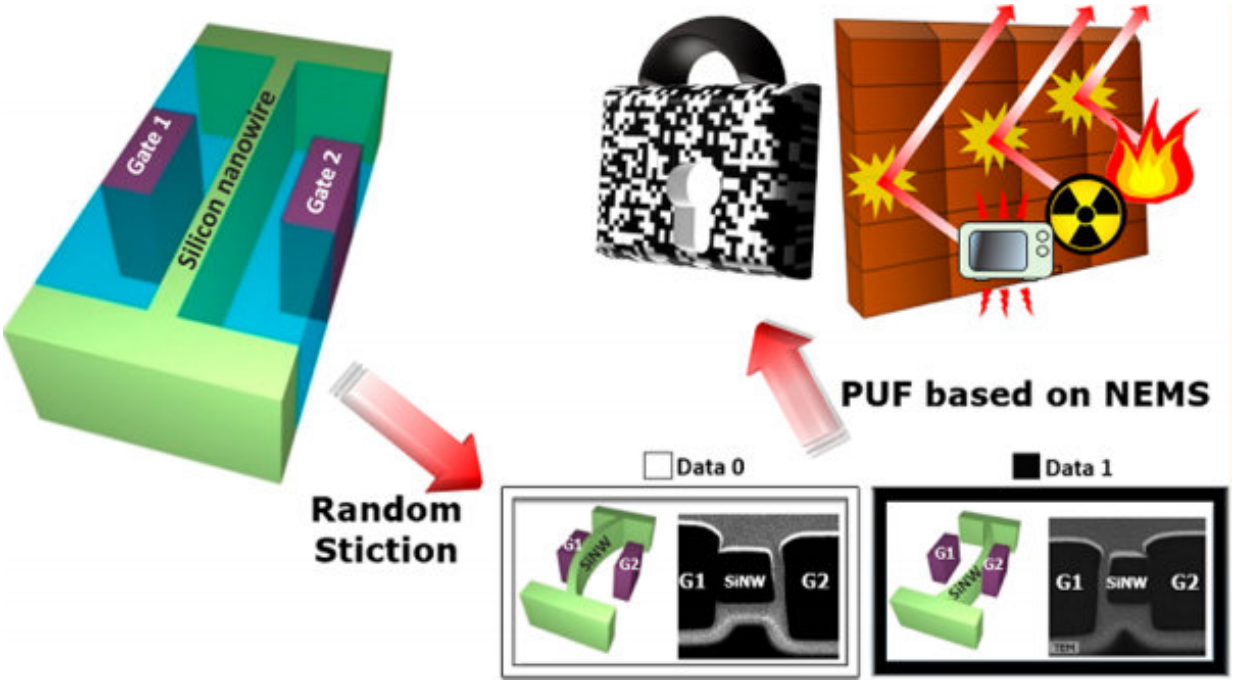

Credit: American Chemical Society

Many people don't worry about the security of their personal information until it's too late. And protecting data is even more important for military personnel, whose lives could be in danger if some types of information were to get into the wrong hands. Now, one group reports in *ACS Nano* a new way to protect data, especially when it is subjected to extreme environmental conditions.

According to the U.S. Federal Bureau of Investigation, the financial loss from cybercrime in the U.S. was over $1.3 billion in 2016. As this number is only expected to rise in the upcoming years, the military, businesses and individuals are seeking new ways to guard their information. Traditional methods involve installing software, but that can require frequent updates and large amounts of power. As a result, experts have proposed alternative security methods based on hardware. Physical unclonable function (PUF) devices hold promise. Random physical variations occur as this type of hardware is fabricated, which creates a unique structure that is impossible to copy or clone. But current PUFs are sensitive to harsh environments, making them a bad choice for military or outside use. So Yang-Kyu Choi and colleagues wanted to make new PUF hardware that would overcome this challenge.

The researchers designed a PUF based on nano-electro mechanical switches (NEMs), which are often used in circuits and are known for their low power consumption. A nanowire in the contraption floats between two gates. As the liquid used in the fabrication process naturally evaporates, the wire bends and adheres to one of the gates. Depending on which gate the nanowire is touching, a 0 or a 1 is generated. An array of several gates and nanowires can create an unpredictable, unique code. The NEM-PUF withstood exposure to high temperatures, microwaves and high-dose radiation. In the case of a data breach, it can self-destruct, providing an additional layer of security.

More information: Kyu-Man Hwang et al. Nano-electromechanical Switch Based on a Physical Unclonable Function for Highly Robust and Stable Performance in Harsh Environments, *ACS Nano* (2017). DOI: 10.1021/acsnano.7b06658

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