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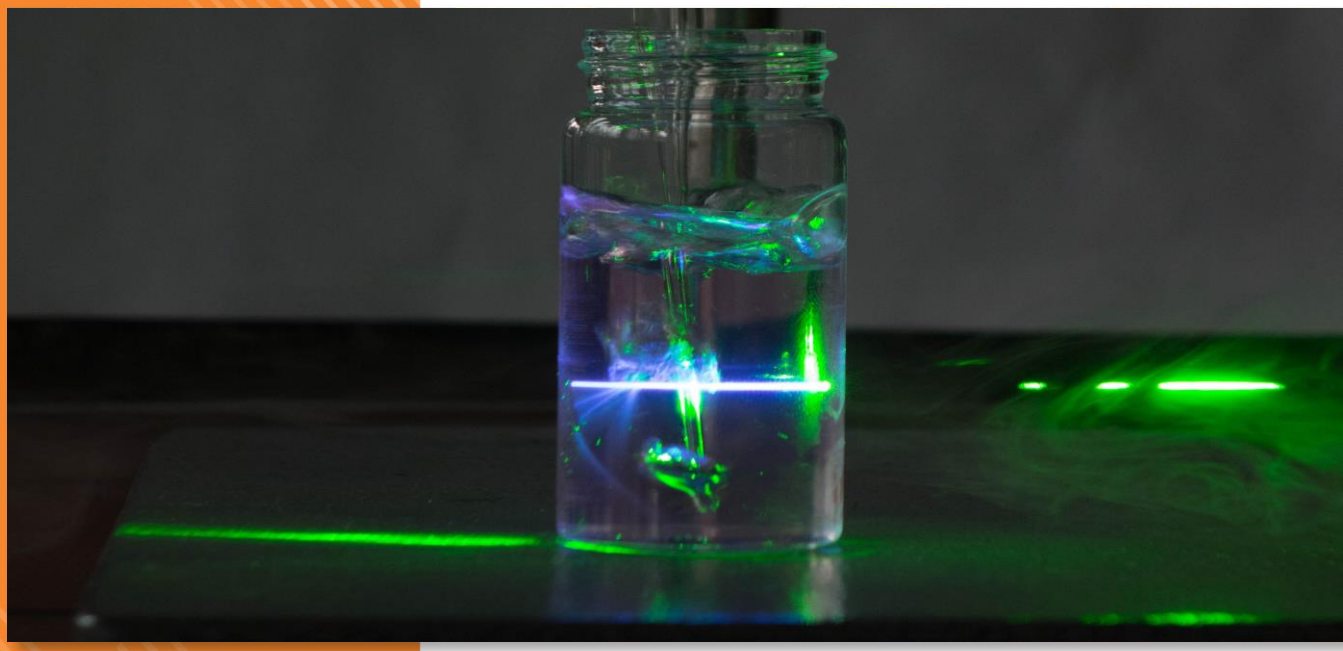

Emerging semiconductors meet new applications: security, multi-valued computing, and hazard monitoring

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Since its proposal by Dr. Dawon Kahng and Dr. Mohamed M. Atalla in 1959, the metal-oxide-semiconductor field-effect transistor (MOSFET) has played a crucial role in modern electronic devices. With over 1.36 trillion MOSFETs manufactured since its commercialization in 1960, it has found widespread use in processors, image sensors, memories, and various other applications. However, the scaling of MOSFETs is currently encountering physical limitations, leading to challenges such as low process yields (around 70%) and problems arising from short-channel effects. As a result, there is an increasing demand for next-generation semiconductor devices.

In this talk, we propose an approach called "Material-Device-Application Co-Consideration" for the development of new applications. This approach involves bottom-up processes that leverage emerging materials. Specifically, we will focus on our recent efforts in the development of multi-valued logic (MVL) by controlling negative differential transconductance (NDT). We will also discuss the utilization of atomically-thin graphene and self-assembled monolayers in the creation of physically unclonable functions (PUFs) for information security. Furthermore, we will explore deep ultraviolet (DUV) region (280 nm – 200 nm)-based emerging applications: (i) partial discharge detection, (ii) flame sensing for fire monitoring and (iii) blood component identification. These topics will be covered in-depth during the presentation.

13. November 2023
16:00 Uhr
Campus Freudenberg
Hörsaal FZH3

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