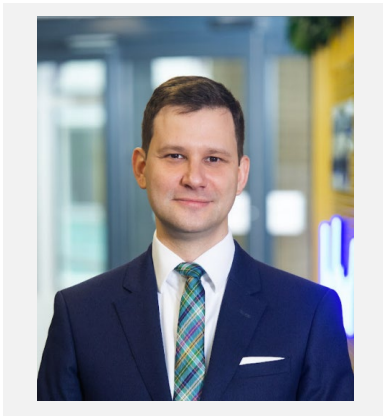


Key considerations for obtaining high performance contact-controlled thin-film transistors

Abstract

Source-gated transistors (SGTs) have a relatively long history of development but only recently have mainstream technologies allowed for their effective implementation at scale. This talk is addressed to those interested in efficient analog and mixed signal design with advanced thin-film transistors. They provide a development progression with a forward look toward SGT application to future edge processing of sensor data, signal conditioning, and current-mode driving. Crucially, the concept can be applied in practically any material system. As such, the talk will present the fundamentals of contact effect engineering and modelling, design rules for successful SGT implementation, specifics of performance optimisation in thin-film silicon, organic, and oxide semiconductors, and structural evolutions for additional functionality. Finally, the next step in the evolution of contact-controlled thin-film transistor, the multimodal transistor (MMT) will be briefly introduced.



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Dr Radu Sporea is Associate Professor in Semiconductor Devices at the University of Surrey, and holds an EPSRC Early Career Fellowship (2021-2026). He was RAEng Research Fellow (2011-2016), EPSRC PhD+ Fellow (2010-2011) and PhD researcher (2006 – 2010). Radu studied Computer Systems Engineering at “Politehnica” University, Bucharest, and worked as Design Engineer for Catalyst Semiconductor Romania on ultra-low-power CMOS analog circuits. Radu was named EPSRC Rising Star in 2014 and received the I K Brunel Award for Engineering in 2015, the Vice Chancellor’s award for Early Career Teaching in 2017 and the Tony Jeans Inspirational Teaching distinction in 2018. In 2021, he was a finalist for Innovator of the Year prize at Surrey. His research focuses on advanced thin-film transistors for improved manufacturability, large area sensors and sensor arrays for smart environments, and paper-based electronics and physical-digital interaction. He is chair of the IEEE EDS UK and Ireland chapter.