

# FENA and the FCRP Live Meeting Seminar Series Presents

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### “CMOL: A New Concept for Nanoelectronics”

I will review the recent work on devices and architectures for possible future hybrid semiconductor/nanodevice integrated circuits, in particular those of “CMOL” variety. Such circuits would combine an advanced CMOS subsystem fabricated by the usual lithographic patterning, and a two-layer nanowire crossbar (formed, e.g., by nanoimprinting) with the wires connected, at each crosspoint, by two-terminal nanodevices. The CMOL concept enables a combination of the advantages of its components (e.g., reliability of MOSFET transistors and minuscule footprint of nanodevices), as well as those of patterning techniques: the flexibility of the optical lithography and the potentially low cost of nanoimprinting and nanodevice formation (e.g., chemically-directed molecular self-assembly). This powerful combination may allow CMOL circuits to reach an unparalleled device density (up to  $10^{12}$  functions per  $\text{cm}^2$ ) and ultrahigh information processing performance (up to  $10^{20}$  operations per second per  $\text{cm}^2$ ), at acceptable power dissipation (below  $100 \text{ W/cm}^2$ ) in several digital and mixed-signal systems-on-chip. The main challenge on the way toward practical CMOL systems is the development of reliable chemically-directed self-assembly of mid-size (3-nm-scale) molecules.

#### Main Reference:

K. K. Likharev and D. B. Strukov, “CMOL: Devices, Circuits, and Architectures”, to be published in: G. Cuniberti *et al.* (eds.), *Introducing Molecular Electronics* (Springer, Berlin, 2005), Ch. 16; preprint available online at <http://rsfq1.physics.sunysb.edu/~likharev/nano/Springer04.pdf>

Thursday, March 17<sup>th</sup>  
11:30 AM (Pacific), 2:30 (Eastern)  
UCLA, 5401 Boelter Hall

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