



# SECOND INTERNATIONAL NANOTECHNOLOGY CONFERENCE ON COMMUNICATIONS AND COOPERATION

## Abstract

### **Room temperature ferromagnetic spintronic logic gates**

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Spintronics, in which both the spin and charge of electrons are used for logic and memory operations, promises an alternative route to traditional semiconductor electronics. A complete logic architecture can be constructed that uses planar magnetic wires of nanometre-scale dimensions. Logical NOT, logical AND, signal fan-out and signal cross-over elements each have a simple geometric design and can be integrated together into one circuit. Working nanocircuits comprising all of these logic elements will be described, as well as a proposal for a new ultrahigh density data storage device based on domain walls circulating in 3-dimensional magnetic networks, which could replace Flash memory and ultimately the hard disk drive (*Science* 390, 1690 (2005)).