



Spin-based Optoelectronics with Semiconductor Quantum Dots

By Pablo Asshoff

Shaker Verlag Apr 2012, 2012. Buch. Book Condition: Neu. Neuware - With the serendipitous discovery of what was later recognized to be the electron spin, O. Stern and W. Gerlach in 1922 set the stage for a series of advances in a field that in recent times was termed spin-electronics, or in short spintronics. The electron spin, beyond its relevance for the interpretation of physical phenomena, bears the promise of providing new electronic device concepts. The observation of tunneling magnetoresistance was one of the first major breakthroughs in this regard, followed later by the discovery of the giant magnetoresistance effect, both of which are spin-dependent phenomena that have led to the development of read heads nowadays commonly used in magnetic hard disk drives. In the last years, further new device concepts were conceived to which the electron spin is central. Among them, magnetic racetrack memory, a technology based on spin-torque magnetic domain wall motion, and the all-optical alignment of magnetic domains by the inverse Faraday effect are promising for future applications in the magnetic recording industry. Another prominent spintronic device is the spin-transistor, proposed in 1990, which may outperform conventional semiconductor transistors if developed successfully. What are the challenges ahead...



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