

Large Magnetoresistance Effect in Silicon

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Over the past 50 years, silicon has been one of the most intensively studied materials because of its vast applications in the electronics industry. Its electronic properties have been widely established and applied for the development of devices like diodes, transistors, and sensors. Thus, it has been thought that no phenomenon remains to be discovered in it. Nevertheless, here, I present a new basic property of silicon. A simple device based on silicon held between two non-magnetic metallic electrodes shows a remarkably large magnetoresistance — the dependence of electrical resistance on magnetic field — of over 1,000% at room temperature. This is comparable to the 'colossal' magnetoresistance found in certain magnetic systems [1, 2], although the underlying mechanism is very different, in the case of silicon appearing to derive from the space-charge effect [3]. The observed magnetoresistance effect could be utilized to develop new magnetic devices based on silicon.

Reference

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