Research shows there could be no end in sight for Moore's Law

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The fast pace of growing computing power could be sustained for many years to come thanks to new research from the UK's National Physical Laboratory (NPL) that is applying advanced techniques to magnetic semiconductors.

Moore's Law observed that the density of transistors on an integrated circuit doubles every two years. Components have shrunk over time to achieve this, but experts believed that when the characteristic transistor size reduces below ~ 20 nm, heating and quantum effects will become so severe that they will not be of practical use.

In a paper published in one of the most cited scientific journals, *Nano Letters* (ISI citation factor is 9.627), researchers at NPL looked at solutions to this problem as part of a project dealing with magnetic phenomena at reduced dimensions.

In the paper NPL's scientists reported on their research on single crystalline Mn-doped Ge nanowires that display ferromagnetism above 300 K and a superior performance with respect to the hole mobility of around 340 cm2/Vs and other industrially relevant parameters, demonstrating the potential of using these nanowires as building blocks for electronic devices.

Senior Research Scientist at NPL Dr Olga Kazakova said:

'The solution lies in changing not only the material but also the structure

of our transistors. We have worked mainly with germanium nanowires that we have made magnetic. Magnetic semiconductors don't exist in nature, so they have to be artificially engineered. Germanium is closely compatible with silicon, meaning it can easily be used with existing silicon electronics without further redesign. The resulting transistors based on NPL's germanium nanowire technology, which could revolutionise computing and electronic devices, could realistically be 10 years away."

Source: National Physical Laboratory