

Survey of ultra efficient solar and 3-d transistors essays examples

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ABSTRACT

The Future of computing lies in the development of smaller, low-powered solutions coupled with unlimited cloud services. Smartphones are becoming powerful enough to run desktop applications while tablets are replacing personal computers such as laptops. Intel's 3D transistors are the reason for this technology shift.

In the same breadth, Moore's law is applicable in solar devices. Given the high cost of energy, firms have been shifting to green energy in a bid to minimize operational costs. One such establishment that generates energy from solar is Semprius. Based on size, Semprius designs and manufactures the world's smallest solar cells capable of producing the highest and most efficient solar modules in the world. Under the right circumstances, solar cells from Semprius could produce more power cheaply than fossil fuels. This paper explores two breakthrough technologies in the world today. This includes Intel's 3D transistors and Semprius' ultra efficient solar cells.

3D Transistors

Intel's 3-D Tri-Gate transistors come with unprecedented benefits. It enables chips to run at lower power voltage with low leakage, providing improved performance and energy efficiency. The capabilities give designers the flexibility to choose transistor targeted at low power and high performance applications and devices.

Mobile devices are the target. The Atom Chip codenamed Merrified will

improve performance and energy efficiency of Smartphones. Compared with the second generation transistor, 3-D 22nm transistors exhibit four core processor with integrated graphics and 1.4 billion transistors on a 160mm² substrate. Prior to the 3-D technology, Intel has transitioned to the 22-nm technology as part of its Moore's driven philosophy that aims to produce ever-decreasing smaller silicon transistor with doubling speed performance and power management. The 3-D transistor will be applicable to both the 22nm process nodes as well as the 14nm manufacturing node.

Intel's 3-D Tri-Gate transistor provide an increase of up to 37% speed up at low voltages and 50% active power reduction at same performance. The Tri-Gate has a fully depleted structure with reduced channel doping to give high performance and reduced variability.

Future trends involve the shift to the 14nm transistors. However, for a period of three years, Intel could enjoy dominance before other industry players get past the 22nm process nodes. The challenge lies in manufacture-ability. This is well known in the industry as the production needs to be at a level where economic sustainability is attained. Given the challenge with the unstable mobile devices market, the trend could take long.

Semprius Ultra efficient Solar

Semprius deliver an exceptional high concentration photovoltaic HCPV module that uses the world's smallest solar-cell to create solar devices with unprecedented costs and performance. Semprius ultra efficient solar can convert almost 34% of the light it receives to electricity. The technology, once scaled up to viable quantities, can replace power plants fueled by natural gas and coal.

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Semprius uses a unique material - gallium arsenide to convert light rays into electricity. Compared to silicon, gallium arsenide is by far (about 12%) more efficient. The gallium arsenide cells are placed under a glass lens that has the ability to concentrate light by up to 1, 100 times. Gallium arsenide has an advantage over silicon cells in that it does not require a cooling system as a result of light concentration on the cells. Thus, compared to other cells, organizations using ultra efficient solar reduce on cost considerably.

The only challenge that is facing the company is the initial high cost of gallium arsenide and the limitations of concentrating light. The system is efficient under direct sunlight on a cloudless sky but energy production drops significantly under contrary conditions. Thus, the glass lens used to concentrate light could drive the cost up.

Second, the economic viability is another challenge. Semprius must produce enough quantities to balance with conventional silicon panels whose prices have dropped significantly.

Future research on ultra cells are pointing at commercial and utility-scale applications such as specialized military and racing automobiles which are constantly in motion. Advances could be directed at minimizing weight and thickness to produce viable systems.

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