Description of NOVA's "Making Stuff: Smaller"

In the current information age, the triumphs of tiny are seen all around us: smaller transistors and microchips used in ever-shrinking laptops and cell phones. Now David Pogue takes viewers to an even smaller world, examining the latest in high-powered nanocircuits and microrobots that may one day hold the key to saving lives and creating materials from the ground up, atom by atom. He explores the star materials of small applications, including silicon—the stuff of computer chips and carbon—the element now being manipulated at the atomic level to produce future technology.

Main Ideas

- Nanotechnology is the science of manipulating matter at atomic and molecular scales to make useful materials. It is a diverse field, with applications ranging from creating stained glass windows to making electronics to curing cancer.

- Making things smaller is not a new idea. For example, centuries ago, watches were invented when big wall-mounted clocks were miniaturized. Using very small components, watchmakers were able to use a much smaller space to create a timekeeping device. Today, new technologies and materials are making incredibly small devices a reality, and opening up a new world of possibilities.

- In the electronics world, technological advancements mean making stuff smaller and more powerful. The components of computers once took up entire rooms but are now densely packed on small chips that are ubiquitous in everyday life (inside our laptops, cell phones, and digital cameras). Today's electronic components are measured on the macro- and microscale. To push the limits of "smaller," materials scientists are investigating how to build and work on the nanoscale (billionths of a meter).

- The computer revolution is based on making the switches that control the flow of electrons smaller. Today's switches are transistors made of silicon; about two billion transistors fit on a chip that is smaller than a dime. To make future electronics even smaller, researchers are developing ways to control the flow of electrons using new materials such as nanowires and graphene (carbon).

- Nanotechnology has amazing medical applications. For example, miniature cameras that travel within the body help doctors literally see what's going on inside a patient. Nanoparticles can provide quick tests for genetic variations in DNA. In the future, tiny devices could do biopsies or deliver treatment (by targeting and destroying cancerous cells without harming healthy cells, for example).