



Description of NOVA's "Making Stuff: Stronger"

The series begins with a quest for the world's strongest stuff. David Pogue helps viewers understand what defines strength by testing the world's strongest materials, ranging from mollusks, Kevlar[®], and carbon nanotubes to the beak of the toucan and spider silk. He travels to the deck of a U.S. naval aircraft carrier, rides in a crash car in a demolition derby, and visits the country's top research labs to check in with the experts who are looking to nature to create the next generation of strong "stuff."

Main Ideas

- Materials can be strong in different ways. Some types of strength include compression strength (the ability to withstand squeezing), tensile strength (the ability to withstand pulling), and toughness (how much energy a material can absorb without breaking).
- The atomic structure of a material determines its strength. For example, steel is an alloy of iron and carbon that, like all metals, has a crystalline structure. The addition of carbon hardens the iron by locking the layers of iron atoms into a strong, rigid structure.
- Materials scientists can strengthen materials, such as steel, by manipulating how they are made. They can also create entirely new materials, such as Kevlar[®], a synthetic polymer with very high tensile strength and toughness. Materials scientists create and combine materials to design new materials with specific properties.
- Scientists study the natural world to learn how nature produces strong materials, such as a toucan's beak or spider silk. Materials scientists borrow ideas from nature to design new materials.
- The next generation of strong materials may be very different from what we are used to. For example, we can grow carbon nanotubes (carbon atoms that are arranged in a rolled-up structure that has exceptional strength) and make artificial spider silk by genetically engineering goats to produce milk that contains spider silk proteins.