

# What Is Materials Science?

Materials science is the study of stuff. Almost everything around you and everything you use each day—the clothes you wear, the dishes you eat from, the computer you use, the bike or skateboard you ride—is made of materials. Materials can be natural, like wood, or synthetic, like plastic.

## Who Are Materials Scientists and What Do They Do?

You've probably heard of a chemist, a biologist, or a physicist, but not a *materials scientist*. One reason is that materials science covers a wide range of activities and touches on many different fields—including chemistry, biology, and physics.

A materials scientist investigates how materials are put together, how they can be used, how they can be changed—and how they can be improved to do even more amazing things. Materials scientists also create materials that have never existed before! Sometimes materials scientists are called *ceramic* or *polymer engineers*, or *metallurgists*, and you can find them working in industries, labs, and universities all over the world.

In the past, people used and changed materials by trial and error. They worked on a big, visible scale—for example, heating, then rapidly cooling, chunks of iron to make it harder. Modern materials scientists manipulate and change materials based on fundamental

understandings of how the materials are put together, often on the invisibly tiny scale of atoms. How small is that? You'd need trillions of atoms to make a speck as big as the period at the end of this sentence.

## What Kinds of Materials Are There?

There are about 300,000 different known materials. If you named one every second, it would take you more than three days and nights just to get through the list! And, as materials scientists continue to create and combine materials in new ways, the number is always growing. Most materials fit into a few big, general categories: metals, ceramics, semiconductors, polymers, composites, biomaterials, and entirely new types of exotic and strange materials, such as carbon nanotubes, which are very tiny spheres or cylinders made of carbon atoms. Such nanotechnology is taking materials science into a new dimension, as scientists create new materials atom-by-atom and molecule-by-molecule—leading to properties and performance never before imagined.



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