Program

Scene 1: Paper

Scene 2: Ink

Scene 3: Printing Processes

Scene 4: Electronic Paper

Paper Facts

- The average American uses about 749 pounds of paper and paper products each year.
- About two-thirds of the raw material used to make paper in the U.S. comes from recovered paper that is recycled, and the wood debris left from lumber manufacturing.
- Toilet paper in roll form was introduced in America in 1871.
- Paper towels were accidentally invented in 1907 when a run of bathroom tissue came out too thick on the paper machine.
- In 1666, in England, cotton and linen were prohibited from being used for burial shrouds in order to make them available for papermaking.

Today, we are surrounded by a wealth of science and technology that was unimaginable a century ago. However, we often do not consider the how and why behind many objects we take for granted in our everyday lives. Take a look closer at the many objects and materials that surround you. You will discover that there are a lot of brilliant ideas in every day use. Scientists and engineers are constantly investigating even the smallest details of how the world works and using this knowledge to develop new products that make our lives easier and more productive. We challenge you to take a peek at the world you live in and realize that we truly are surrounded by smart materials!

In this presentation, we are going to take a closer look at paper and printing, which is such an essential part of our lives that it's hard to imagine life without it. If there were no paper, there would be no textbooks, no toilet paper, no secret notes during class. While we may take paper for granted, it has some pretty amazing science and engineering behind it! We will investigate the properties of paper that make it indispensable in so many different applications. Following the timeline for invention and re-engineering of paper, we will examine the science behind a whole series of inventions that have developed around paper and printing, from pens and ink, to printing presses and printers. We will finish with a brief glimpse into the future, taking a look at how researchers today are developing a remarkable invention called electronic paper. It looks like real paper—but changes like a computer or a TV screen. One day, you may be able to carry all your textbooks in your pocket!

Lord Rayleigh (1842–1919) was one of the great scientists of all time. He worked in all areas of physics, including the topic of this morning's presentation. In 1904 he won the Nobel Prize in Physics for his discovery of the inert gas Argon (*argon* is Greek for "inactive".)

Johannes Gutenberg (c. 1397–1468) was a German goldsmith and inventor best known for the Gutenberg press, an innovative printing machine that used movable type. The Gutenberg press with its wooden and later metal movable type printing brought down the price of printed materials and made books and printed matter available to the masses. It remained the standard until the twentieth century.

Links for more information:

www.rigb.org • www.mrsec.harvard.edu • www.nsec.harvard.edu • www.eduprograms.deas.harvard.edu • www.deas.harvard.edu

The Materials Research Science and Engineering Center (MRSEC), the Nanoscale Science and Engineering Center (NSEC) and the Division of Engineering and Applied Sciences (DEAS) at Harvard University are committed to increasing public understanding of current and emerging technologies.

Cynthia Balloch is currently an undergraduate at Harvard studying Mechanical Engineering, in the class of 2005. In addition to participating in the preparation of today's Holiday Lecture, she also plays junior varsity ice hockey and organizes a community learn-to-skate program for children in Cambridge. She graduated from Trinity College School, a high school in Port Hope, Ontario in 2001. "I've chosen engineering because it's a great way to look at the world. Though we learn sciences, in engineering we learn more practical aspects of how things work, how science drives technologies, and how to use our knowledge to resolve real-world problems. In fact, the word engineer comes from the French word for ingenuity, and in practice, engineers are trained to have that sort of application—an imaginative approach to the world, and the intellectual tools to create clever designs and constructions for it.

Daniel Rosenberg is part of the talented lecture demonstration team in the Science Center whose creativity is on display each day in these lecture halls to elucidate the principles of science. Daniel Rosenberg is a 1984 Harvard College graduate and a chemist. Daniel has also applied his passion for science in other venues such as the annual Ig Nobel Ceremony held on campus.

Photo by Flint Born, *Harvard Magazine*

Howard Stone is Professor of Chemical Engineering and Applied Mechanics and Harvard College Professor in the Division of Engineering and Applied Science at Harvard University. He holds degrees in Chemical Engineering from the University of California at Davis (1982) and Caltech (1988). After a postdoctoral position at Cambridge University, he joined the Harvard faculty in 1989. His research is in the areas of fluid dynamics and applied mathematics. He enjoys the challenge of thinking about real-world problems and he enjoys teaching.

Upcoming Public Science Events

Thursday, March 1: Peer Instruction Workshop
Professor Eric Mazur
Harvard University

Museum of Science, Boston
Current Science & Technology Center Live Events
www.mos.org/cst/section/schedule.html

Please see www.eduprograms.deas.harvard.edu for more events.

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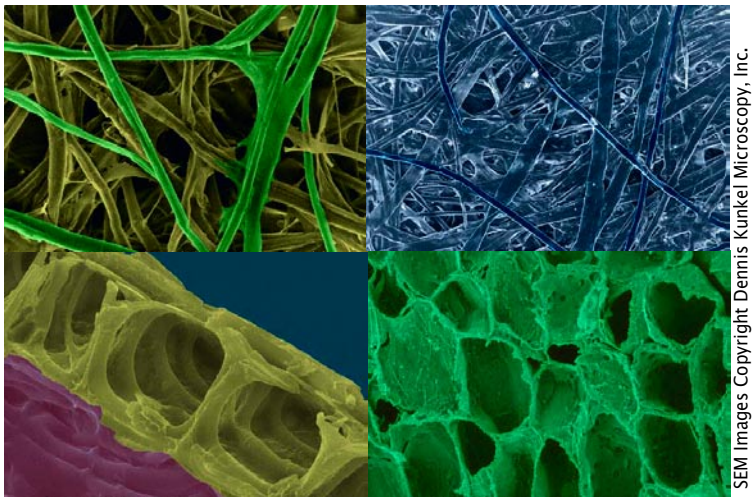
A Holiday Exploration at Harvard University

A Peek at Printing: From Papyrus to Electronic Paper



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Science Center, Lecture Hall B

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