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TRACKING TRENDS & PERFORMANCE IN BASIC RESEARCH


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2008 : October 2008 - Fast Breaking Papers : Matthias Wuttig & Noboru Yamada

FAST BREAKING PAPERS - 2008

October 2008


Matthias Wuttig & Noboru Yamada talk with *ScienceWatch.com* and answer a few questions about this month's Fast Breaking Paper in the field of Materials Science.



Article Title: Phase-change materials for rewriteable data storage

Authors: Wuttig, M; Yamada, N

Journal: NAT MATER

Volume: 6

Issue: 11

Page: 824-832

Year: NOV 2007

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SW: Why do you think your paper is highly cited?

This paper provides an up-to-date summary of the technological breakthroughs and scientific understanding obtained for an important class of materials, i.e., phase change materials (PCMs). These compounds are very attractive for data storage applications. In addition, the paper outlines research areas where a better understanding of the materials is necessary.

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

The paper summarizes the recent understanding, as well as the scientific and technological challenges, to obtain even better material solutions for optical and non-volatile electronic memories.

SW: Would you summarize the significance of your paper in layman's terms?

PCMs combine surprising and, at first sight, contradictory properties. These materials can be stabilized in two different states (phases), which have very different properties. The optical and electrical properties of the amorphous and crystalline state differ significantly, which implies that the atomic arrangement in both phases is quite different.

At the same time, these materials enable fast transformations between these two states, which imply that the structures are rather similar. These apparently contradictory conclusions have puzzled scientists for a long time. In our manuscript, a perspective is presented which explains both the fast



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transformation as well as the property contrast facilitating a unified view of these materials.

SW: How did you become involved in this research, and were there any problems along the way?

The unique properties of PCMs attracted our interest because they came along with technological opportunities and interesting scientific challenges. To advance the present understanding, we had to develop new perspectives several times during the course of our research in order to obtain a better understanding of the materials. It should be added that, since the early 1970s, it has been an ultimate dream for the researchers in this field to realize a rewritable video disc using this attractive phenomenon.

SW: Where do you see your research leading in the future?

We intend to tailor materials to help meet the diverse needs required by different emerging memory applications.

SW: Do you foresee any social or political implications for your research?

This research could help pave the way for a new generation of storage devices. These materials could combine the benefits of the speed of fast volatile memories and the longevity of non-volatile memories, i. e., they could serve as materials for a universal memory.

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Keywords: phase change materials, data storage applications, material solutions for optical non-volatile electronic memories, new generation of storage devices, speed of fast volatile memories, longevity of non-volatile memories.



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