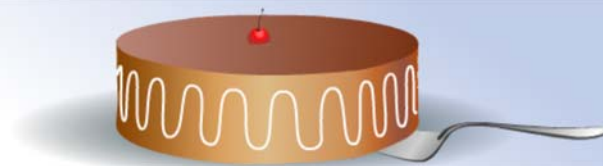
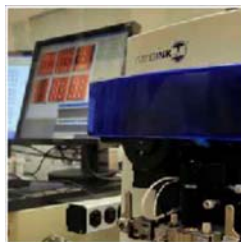


# a piece of cake!



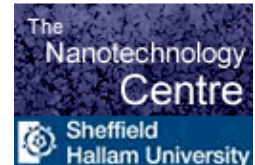
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## University Buffalo Tackles Electromigration and Thermomigration




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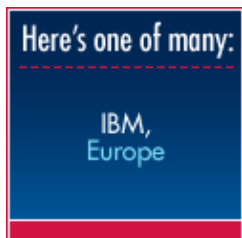
[University at Buffalo](#) engineers are working to solve two significant roadblocks impeding the creation of smaller, faster and more powerful electronic devices.

Working atom by atom, Cemal Basaran, Ph.D., and David Kofke, Ph.D., are taking on the problems of electromigration and thermomigration -- the tendency for atoms to behave erratically when charged by the very high density electrical currents required to power super-small and super-powerful electronic devices.

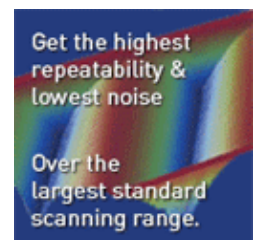
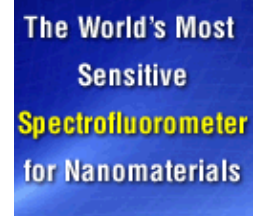
Basaran is director of the Electronics Packaging Lab in the UB School of Engineering and Applied Sciences and is professor in its Department of Civil, Structural and Environmental Engineering. A UB Distinguished Professor, Kofke is chair of the Department of Chemical and Biological Engineering in the School of Engineering and Applied Sciences.

High electrical current densities

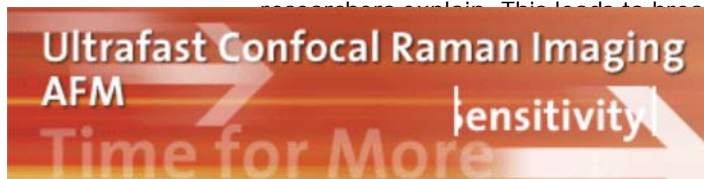
[SANYO Breaks Solar Cell Record](#)



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and high temperature gradients create voids within metal conductors, the



WITec is a manufacturer of high resolution optical and computer simulations and laboratory for scientific and industrial applications

Basaran and Korte are using computer simulations and laboratory experiments to devise ways to design or stop electromigration and thermomigration. Engineers from the Intel Corp. are collaborating with the

UB researchers on the project.

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component in a computer chip. "At the nanoscale," says Basaran. "But unless you have fast-performing nanoelectronics, miniaturization in electronics may not be possible."



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The science of nanoelectronics is focused on creation of nanoscale circuits, wires and packaging of semiconductors. The goal of industry is to use these

components to manufacture a new class of very small and very powerful

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electronic devices, such as wristwatch-sized supercomputers. One nanometer is about 1/100,000 of a human-hair diameter.

Working at the nanoscale level, the researchers intend to build semiconductor devices one atom at a time. According to Basaran, controlling placement of atoms in a material will give the researchers precise control of their properties, thus reigning in the erratic behavior that causes system breakdowns.

"When you design materials at the atomic scale you get properties you wouldn't get otherwise," Basaran says. "You get exact properties that you want instead of what nature dishes out for you. This means you can do things with a material that you couldn't imagine doing before with the same material."

The goal of the UB researchers is to design nanoscale chips, circuits and solder joints that can withstand very high current densities and very high temperature gradients.

"High current density changes everything," Basaran says. "It makes everything faster and more powerful. If you want a faster computer you need higher current density."

Today's computers operate at a maximum 1,000 amps per square centimeter. The UB researchers' work may one day enable computers to operate with a current density 1,000 times greater.

The University at Buffalo is a premier research-intensive public university, the largest and most comprehensive campus in the State University of New York.

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Posted 24th February 2006

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