Graduate students sparkle in national innovation competition
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When the Glass Manufacturing Industry Council, the Glass and Optical Materials Division of the American Ceramic Society, the Center for Glass Research and the National Science Foundation International Materials Institute on New Functionality in Glasses wanted to know about bright ideas for the innovative use of glass, they quite naturally turned to the nation's Materials Science graduate students.In the national competition with $5,000 in prize money, they posed a series of questions with to the graduate students: "What new applications can you imagine for a stronger glass? What degree of improvement in systems performance might emerge? What about energy savings and environmental impact? How might your innovation change our lives?" It probably didn't come as much of a surprise to anyone when graduate students from Alfred University's School of Engineering - which has the only Ph.D. program in glass science in the United States and is one of only three in the world - brought home more than half the prize money.Melodie Schmitt, a 2004 alumna of Alfred University who is now working on an advanced degree in Glass Science Engineering, and Harlan Brown-Shaklee, a 2005 AU alumnus who is now studying for a master's degree in Materials Science Engineering, earned first place with their proposal, "Strengthened Glass for Hybrid Wind-Solar Energy Systems."Jake Amoroso, who received his B.S. degree from Alfred University in 2003 and is now a master's degree student in the Materials Science Engineering program, brought home the $500 third prize for his proposal, "The Flywheel Energy Storage System," and Steve Florczyk, a 2004 AU alumnus who is working on a master's in Biomedical Materials Engineering Science, won honorable mention and $250 for "Photosynthetic Powered Glass Automobile."Schmitt and Brown-Shaklee proposed combining wind- and solar-powered generation systems by creating 20-meter windmill blades from glass strengthened by incorporating spherical photovoltaic cells. The resulting blades, they speculate, would be able to collect solar energy at any wind speed. They concluded that their glass blades, which would be mechanically strengthened along the blades to prevent torsion stress failures, would outperform the polyester/glass fiber laminate blades now in use. They also said their proposal is achievable. Glasses nearly as strong as what would be needed for the blades are now being produced in the laboratory.Amoroso suggested manipulating the properties of glasses to allow charging of a cylindrical flywheel to store radiation (infrared to ultraviolet) energy. Design of photosensitive glasses through unique combinations of additives to control the absorption at the surface of the glass allows a tunable flywheel utilizing varying radiation sources such as high power lasers or simple lenses to focus sunlight. A stronger glass is needed to achieve these goals, due to the tremendous angular momentum of the spinning flywheel and the need for high strength containment for safety concerns. This year's prizes are to be awarded at the 3rd International workshop on Flow and Fracture of Advanced Glass, to be held Oct. 4, at Penn State University, State College, PA. The industry consortium plans a new competition, open to global participation, for 2006.