

## Cooperative Research and Development Agreement between Climax and the National Renewable Energy Laboratory

**April 16, 2010** – The Climax Molybdenum Technology Center (CTC) has entered into a Cooperative Research and Development Agreement (CRADA) with the National Renewable Energy Laboratory (NREL) to support scientific innovations in solar cell efficiency. NREL is “dedicated to the research, development, commercialization, and deployment of renewable energy and energy-efficient technologies. NREL's mission and strategy are focused on advancing the U.S. Department of Energy's and our nation's energy goals.”

It is known in the photovoltaic (PV) industry, that the addition of a small amount of sodium into the absorber layer of copper, indium, gallium, selenium (CIGS) thin film solar cells will increase the conversion efficiency of the device. Increasing the proportion of solar energy that is converted to electricity is key to making solar energy cost-effective. However, the means to introduce the optimum amount of sodium into CIGS in a controllable and predictable manner in a production environment had been a challenge to the industry.

The Climax Molybdenum Technology Center has developed MONA<sup>®</sup>, an innovative blend of sodium-containing molybdenum metal powder, that can be produced and consolidated, using patent-pending methods, to form sputtering targets suitable for depositing thin films of sodium-containing molybdenum. By depositing these films atop the molybdenum back conductor prior to the deposition of the absorber in CIGS devices, specific quantities of sodium-bearing molybdenum metal is placed in intimate contact with the CIGS absorber; subsequent processing of the device would allow a precise amount of sodium to diffuse into the CIGS layer. MONA<sup>®</sup> powder was engineered to provide that optimum sodium dose in a cost-effective method which also increases the reliability of mass produced PV cells by simplifying the device structure.

The agreement between the two organizations will help advance research and development in the PV marketplace. Climax is looking forward to working with NREL on this effort.