Fool's gold catches eye of solar energy researchers

January 21 2011, By Tiffany Hsu

Iron pyrite - also known as fool's gold - may be worthless to treasure hunters, but it could become a bonanza to the solar industry. The mineral, among the most abundant in the earth's crust, is usually discarded by coal miners or sold as nuggets in novelty stores.

But researchers at the University of California-Irvine said they could soon turn fool's gold into a cheaper alternative to the rare and expensive materials now used in making solar panels.

"With alternative energy and climate-change issues, we're always in a race against time," said lead researcher Matt Law. "With some insight and a little bit of luck, we could find a good solution with something that's now disposed of as useless garbage."

The UC-Irvine team believes the mineral can be processed into a thin film for use in photovoltaic cells, and could eventually convert sunlight into electricity at roughly the same rate as existing technology.

Though it's too early to estimate the cost of cells made with pyrite, Law said they're likely to be cheaper because fool's gold is so readily available. A prototype could be ready within the year, but it could be at least three years before the cells are commercially available.

Some industry analysts, however, are skeptical that the team - which includes a chemist, a mathematician and a physicist - can hit pay dirt.

"I don't want to pour cold water on what they're doing, but every day somebody comes up with a new idea for a solar cell technology," said Shyam Mehta, a solar industry analyst with GTM Research. "Commercializing it is a lot more difficult than people seem to think, and it's full of failed attempts."

To be successful in the market, he said, scientists have to replicate the carefully controlled conditions of a laboratory in a factory capable of producing hundreds of thousands of panels a year, at a cost that can compete with Chinese prices.

The U.S. solar photovoltaics industry is worth at least $2 billion and growing, but not much of the cell-making process occurs domestically. Existing types of cells, such as cadmium telluride and amorphous silicon, use materials that are either very scarce, potentially toxic or not especially efficient.

And other materials such as indium - about $300 a pound - are in high demand for use in touch screens and other tech gadgets. These so-called rare earth elements are available only from a single U.S. mine in California or from China, which is clamping down on exports of the material.

Law and his colleagues believe fool's gold, which is composed of iron and sulfur, could be used to make solar cells in a major production process.

Iron pyrite has been eyed as a candidate for solar panels in scattered studies in the 1980s and '90s, along with other cheaper, abundant materials such as copper oxide, copper sulfide and zinc phosphide, Law said. But a lack of clean-tech financing, unsophisticated processing equipment and lack of interest caused the research efforts to fizzle.

"Now, with better tools and funding and a sense of urgency, more people are looking again at very promising materials that might have had one stumbling block or two earlier that had tripped them up," Law said.

One of the challenges in developing solar cells from fool's gold is that the material has poor voltage. That is, the mineral is full of microscopic pockets that suck in electrons, limiting conductivity and the ability to convert solar energy into electricity. Law's team is working on ways to plug the holes.

The work is being funded in part by a three-year grant from the National Science Foundation's solar program.

Law said the effort is attracting the attention of solar companies and other researchers, many of whom are starting to look into iron pyrite again. But with existing photovoltaic technology already so established, new solar innovations will have a harder time catching up in the market, he said.

"There's a narrowing window for new technology to come online," Law said. "If we fall asleep at the switch, it'll be much more difficult to compete against big companies that are already learning to do this better, more efficiently and faster."