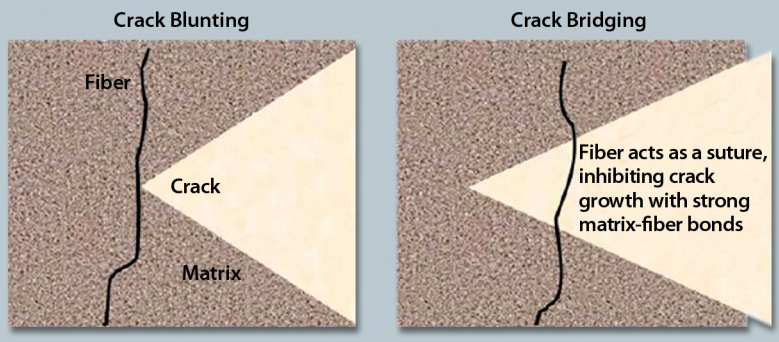
Toughened Graphite Electrode for High Heat Electric Arc Furnaces

UT-B ID 200601819



Benefits of Fiber Toughened Electrode

Technology Summary

A tougher and more resilient graphite electrode was developed at ORNL to melt steel, titanium, and other scrap metal in industrial electric arc furnaces. Researchers invented a carbon fiber-pitch binder composition that is tough enough to avoid recurrent electrode failure in industrial smelting. The technology also reduces the amount of carbon needed in the production process and resolves inefficient dispersion of carbon in current technology.

Graphite electrodes are made by mixing petroleum coke particles with a pitch binder, extruding the mix through a die, and graphitizing them. Cracking or failure of the electrode in the electric arc furnace before the scrap has been successfully melted results in significant loss of productivity. To reduce the failure rate, the electrodes are toughened with bundles of carbon fibers that are dispersed in the pitch.

However, carbon is expensive and the bundles disperse poorly in the pitch. Since one fiber of carbon is as effective per unit of electrode material as a bundle, the invention's use of single fibers that disperse more homogeneously is an important innovation.

Advantages

- Energy cost savings
- Fewer broken electrodes
- Increased productivity
- Faster tap-to-tap times
- Furnace can operate longer without being opened

Potential Applications

- Electric arc furnace steel manufacturing
- Steel refinement and similar smelting processes

Patent

Peter J. Pappano, *Toughened Graphite Electrodes for Electric Arc Furnaces,* U.S. Patent Application 12/353,372, filed January 14, 2009.

Inventor

Peter J. Pappano
Materials Science and Technology Division
Oak Ridge National Laboratory

Licensing Contact

Alexander G. DeTrana
Technology Commercialization, Energy and Engineering Sciences
UT-Battelle, LLC
Oak Ridge National Laboratory
Office Phone: 865.576.9682
E-mail: detranaag@ornl.gov

PARTNERSHIPS