

Production of Activated Carbon Fibers and Engineered Forms from Renewable Resources

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Technology Summary

Carbon fibers are currently produced from non-renewable fossil sources, namely coal, oil, and natural gas, through energy-intensive processes. It is proposed that carbon fibers, in particular activated carbon fibers, could be produced from semi-renewable resources such as lignocellulosic materials; e.g., wood, wood wastes, lignin, and cellulose. Precursor fibers could be drawn using melt-, solvent-, electro-, or air-spinning techniques, etc., and converted into carbon fibers, and subsequently activated carbon fibers, using conventional thermal processing and activation techniques. However, for the production of activated carbon fibers, large energy savings could be achieved by using chemical activation techniques. For example, precursor fibers could be drawn with in situ inclusion of the chemical agent, such as phosphoric acid. Phosphoric acid would serve a dual purpose by acting as an extrusion aid during drawing of the precursor fiber. The activated carbon fiber would be produced directly from the acid-containing fiber by thermal treatment at much lower temperatures (400-500 C) than used for thermal activation (1000 C), without isolating the intermediate carbon fiber. Energy savings would be further enhanced through the much shorter processing times inherent to chemical activation techniques. The activated carbon fibers could be converted to engineered forms suitable for diverse applications; for example, carbon fiber composite monoliths and honeycombs.

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