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High throughput production of carbon materials from biomass via molten salt

The heating of biomass in the oxygen-free environment is a proven technique of locking up renewable carbon in a fixed form that will not rot or decay, leading to unwanted emission of greenhouse gases. Traditional pyrolysis using hot flue gas to affect the heat transfer is not in line with economics. We used hot liquid instead to affect the fast heat transfer to comply with economics and to be adaptable for commercialization in the future. Normally, the volumetric heat capacity of liquid is about 2000 times larger than that of gas so that the speed of heat transfer by liquid is at least several hundred times faster than that of gas. Depending on the conditions of production of the charcoal temperature, resident time, and possible pretreatment of the biomass with common environmentally friendly reagents the resulting porous biocarbon is suitable for use as biocoal, a coal replacement but a carbon neutral fuel in thermal power-plants; biochar for burial as a carbon negative soil amendment can improve water retention and/or provide filtration of chemical toxins and pollutants; activated carbon, a material with high specific surface area that can be used for filtration of liquids and gases, or as a substrate for support in catalysis or for electrochemical reactions. The technology is completely scalable from test tube experiment, to tabletop machine, to pilot plant demonstration equipment.

Biography

Fen-Tair Luo is currently a Research Fellow at the Institute of Chemistry in Academia Sinica, Taiwan. He had received his PhD degree in Chemistry from Purdue University. He also did Post-doctorate studies for one year. His research interests are in the molten salt technology to carbonize biomass and he has received the patent of supertorrefaction of biomass from six countries.

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