Applications of Micro- and Nanotechnologies

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Carbon nanofibers and nanotubes are promising to revolutionize several fields in material science and are suggested to open the way into nanotechnology. Further market development will depend on material availability at reasonable prices. We have achieved bulk production capacities of high purity carbon nanofibers (CNFs) at low cost by a catalytic chemical vapor deposition (CCVD) process. Reasonably low temperatures and yields of up to several g/m^{2}min at more than 70% carbon gas-to-fiber conversion rates allow considerable cost reductions. Polymer composites have been prepared by shear mixing of CNFs into polymer matrices and extrusion. Another application of our Carbon nanofiber process technology has demonstrated their satisfying field emission properties for large display flat panel devices. We are also studying new carbon fiber composites for hydrogen storage and electronic thermal management applications. Combined with our existing microcooler technology we will reach new horizons in thermal management of high power devices. Microchannel microcoolers have been enabling a breakthrough of semiconductor lasers for industrial applications.