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Carbon Fibers from Chicken Feather Keratin MELISSA E. MILLER, RICHARD WOOL, Dept Chemical Engineering, University of Delaware — As the availability of synthetic and fossil-fuel based resources is becoming limited, bio-based materials offer an environmentally friendly alternative. Chicken feathers remain a huge agricultural waste. The feathers are comprised of approximately 97% keratin, but are currently used only to enrich animal feed. However, this usage is becoming a problem with the spread of diseases such as Bovine Spongiform Encephalopathy, commonly called "Mad Cow Disease." The hollow, microcrystalline, oriented keratin feather fibers offer a novel, low cost approach to producing carbon fibers through controlled pyrolysis. Carbonized feather fibers (CFF) were prepared by first heating to 225 ^{o}C (below the melting point)in N_2 for 26 hours to crosslink and stabilize the fiber structure; then carbonization occurred by increasing the temperature to 450 ^{o}C for two more hours. The resulting CFF were hollow, stiff and strong and had an affine 80% weight loss, which is near the theoretical value for the C-content of keratin. Initial studies showed that a composite with the CFF and an epoxidized soybean oil (AESO) gave an improved fiber modulus E_{CFF} of order 13.5–66.1 GPa. With continued research, the goals are to increase the stiffness of the feathers to 100 GPa, while increasing the strength in the range of 5-10 GPa.

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