

Recovery of Carbon Fiber from Waste Carbon Fiber Reinforced Plastics using Sodium Hydroxide

Jotaro TAKAHASHI* and Takaaki WAJIMA*

*Department of Urban Environment Systems, Graduate School of Science and Engineering,
Chiba University, Chiba 263-8522 Japan
E-mail: affa6910@chiba-u.ac.jp

Carbon fiber reinforced plastic (CFRP) is a composite material made of carbon fibers and resin, and is widely used because of its light weight, corrosion resistance, and durability. However, its excellent properties make it difficult to recycle, and most of the CFRP waste is landfilled. A new recycling technology to recover the carbon fiber from waste CFRP is desired. In this study, a new method to decompose the resin part by heating waste CFRP with sodium hydroxide (NaOH) to recover the carbon fibers with high strength was investigated. Waste CFRP was heated with NaOH under nitrogen atmosphere at 200-600°C for 0-90 min, then washed with distilled water, and sieved to recover the high-strength carbon fiber. By heating without NaOH, it is difficult to separate the fiber from resin. By heating with NaOH, carbon fiber with high strength can be recovered at 250-350°C by hydrolysis reaction of resin with NaOH and distilled water, while those with low strength at higher than 400°C, due to the pyrolysis reaction of resin and carbon fiber. By immersing the CFRP into NaOH at 300°C, long length carbon fiber with high strength can be recovered.

Keywords : Carbon Fiber Reinforced Plastics, Sodium Hydroxide, Hydrolysis, Pyrolysis