Preparation of Composites from Buckypaper

By infiltrating the pores of the paper with a matrix phase, we can create a high volume fraction nanotube composite. NanoLab performed a test of epoxy infiltration using a carbon nanotube paper to confirm the potential for the preparation of composites using this technique. NanoLab has a setup for vacuum assisted resin transfer molding (VARTM). A mold was sprayed with a release agent, and a peel ply layer was inserted at the bottom of the mold. The buckypaper was placed atop the peel ply, and the vacuum bag was adhered to the top of the mold with tacky tape. Resin was fed up through the bottom of the mold, and a vacuum port was made in the side of the bag.

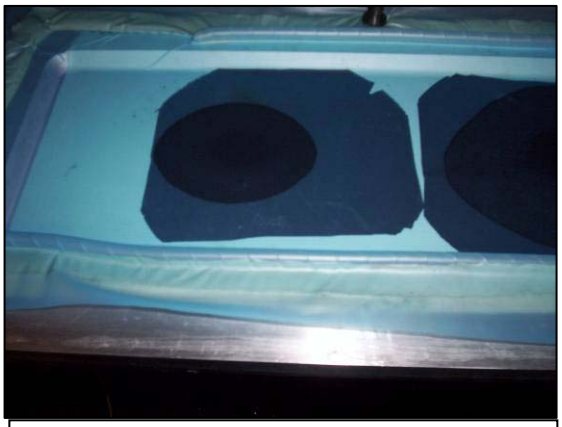

Fig. 2.During VARTM processing, the epoxy wets out the nanotube paper.

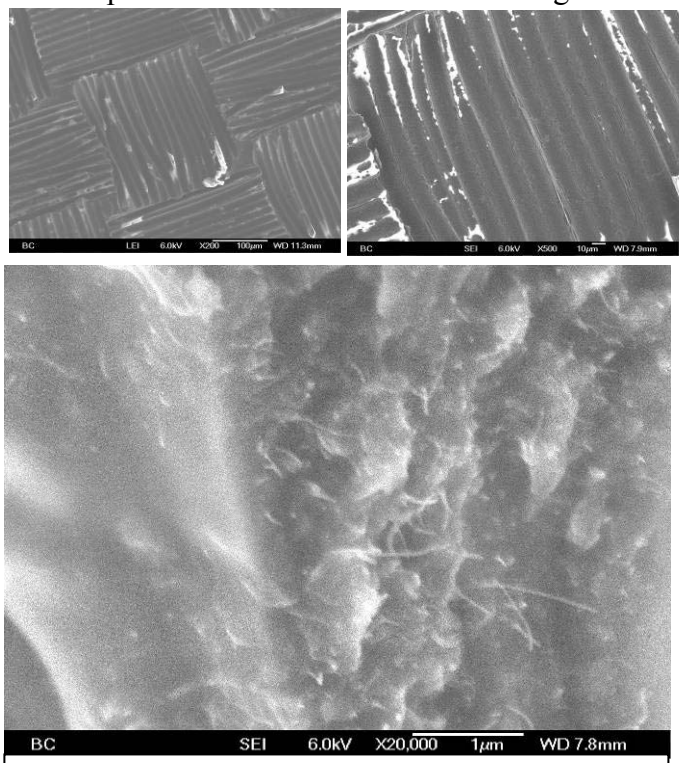

Fig. 3 The weave of the peel ply layer is visible in the cured composite (upper left and right), and the nanotubes are clearly present in high magnification view (lower panel).

For this work, we used an aerospace grade epoxy, which has a low viscosity when hot. We preheated the epoxy and actively heated the mold before and during infiltration. An image taken during the parallel infiltration of two 10cm x 10cm buckypapers is shown in Fig 2.

The thermal cure cycle for the epoxy was followed, and after cooling, the bag was removed, and the buckypaper composite was peeled away from the peel ply layer. The peel ply left its imprint on one surface of the paper, as can be seen in Fig. 3. The nanotubes appear to be in good contact with the epoxy by SEM, and a TEM evaluation confirmed that the surfaces were actually wet by the epoxy. Mechanical tests of the composite are now being performed, and these properties will be reviewed in a later revision of this document.