Radiation Prevention: One Fiber at a Time

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This experiment was conducted as an effort to further technology utilized to better protect humans from this radiation. The goal in performing this experiment was to determine if carbon nanotube coated carbon unidirectional fabric would prove effective in decreasing the amount of ionizing radiation that passes through fabric. Carbon's crystal-lattice molecular structure makes it naturally strong. By creating nanotubes out of this material, it becomes lightweight and remains strong and thus was predicted to decrease radiation penetration rate. To test this, an ionization chamber was built out of a soup can to measure changing voltage through various materials: no cover, aluminum foil, cotton, and carbon nanotube coated carbon unidirectional fabric. The ionization chamber measured a 44% radiation reduction. For more accurate results, the researcher re-conducted the experiment with a Geiger counter. The experiment was replicated and included testing a double-layer carbon unidirectional fabric coated in carbon nanotube epoxy resin, as well as an uncoated piece of carbon unidirectional fabric. Consequently, the single layer fabric resulted in a 55% radiation penetration reduction. The double layer fabric resulted in a 72% reduction rate. The foil had a 7% reduction, the cotton fabric had a 14% reduction, and the uncoated fabric had a 33% reduction. According to these results, the ionization chamber was not completely accurate. In the future, the researcher plans to use the double layer fabric as a layer in sports bras, so as to reduce ionizing radiation exposure and prevent breast cancer for women working in high-risk environments.

Awards Won: