

Inhibition of outgassing from a surface of CFRP (Carbon Fiber Reinforced Plastics) with nano-sized silver paint for COMPASS Experiments

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A nuclear physics experiment, COMPASS, with a high energy beam delivered from the accelerators at CERN, will employ a liquid hydrogen target in the future program. The target cell containing liquid hydrogen is made of 125 μ m Mylar foil and is surrounded by a vacuum chamber for thermal isolation. The vacuum chamber is 80 mm in diameter and 2500 mm or more in length. In order to improve penetration of the particles, the vacuum chamber has to be thin. There are some candidates for its material. One of the most beneficial candidates is CFRP(Carbon Fiber Reinforced Plastic) which consists of carbon fibers impregnated with epoxy resin. However, considerably large amount of outgassing from the surface of the CFRP may cause problems. Usually, to decrease the gassing, aluminum foils are glued onto the surface. However, its dimension, narrow and long, prevents from attaching the foils onto its inner surface. So, we employed so called silver-ink which has been recently developed at Yamagata University. One of its advantages is that it easily sinters at low temperatures below 100 Celsius degree. We have measured the outgassing rate for the silver-ink coated CFRP. It was found that the amount of outgassing rate from the original CFRP is ten times larger than that for silver-coated one.