

Carbon Nanotube Black Body - A Black Hole Absorbing All Light -

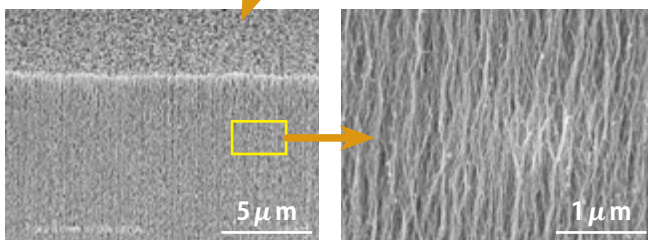
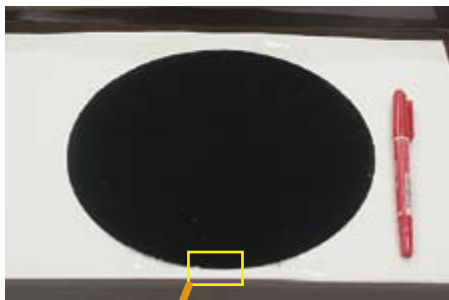
PURPOSE

Light-absorbing coating (black coating/paint) is essential technique for thermal and optical engineering. However, it is difficult with conventional black coating to attain an absorbance more than 0.97 (in other words, reflectance less than 0.03), especially in wide spectral range.

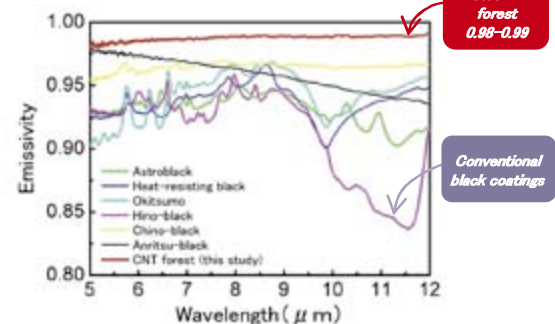
RESULTS

Excellent black coating with vertically aligned forest of single-wall carbon nanotube (SWCNT forest) is successfully fabricated by Super Growth, a novel synthesis method of SWCNTs that was developed in AIST. High absorbance of 0.98-0.99 in an extensive spectral range from UV to Far-IR is achieved owing to nano-scale structure of the black coating, demonstrating capability most similar to black body.

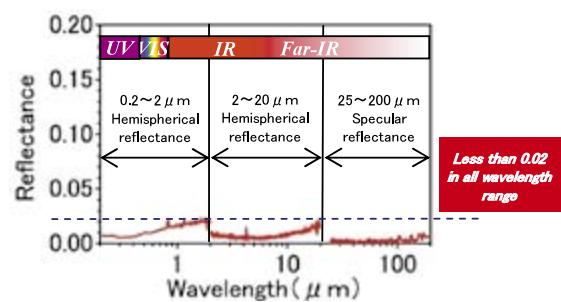
Black coating with SWCNT forest by "Super Growth" method
Synthesis on 8-inch wafer



Nano-scale structure of SWCNT forest (SEM image)



Normal spectral emissivity



Spectral reflectance (UV to Far-IR)

OUTLOOK

Application to various area is possible, for example, solar energy utilization, light shielding from UV to Far-IR region, pyroelectric infrared detector, heat radiator, radiometric standard. (Seeking partners)

REFERENCES

K. Hata, D. N. Futaba *et al*, *Science* 306, 1362-1364 (2004).