



Contribution ID: 338

Type: **Contributed**

Secondary Electron Emission Study of Nanometric Carbon Coatings

Wednesday 20 June 2018 11:50 (20 minutes)

An investigation on the secondary electron emission (SEE) properties and stability of nanometric carbon coatings is reported. The key to creating an ideal material to avoid avoiding multipactor effect or electron cloud in large particle accelerators, is to modify its SEE properties to obtain $SEY < 1$ in all primary energy range. The SEE coefficient (SEY) was measured by single-pulse electron beams with a pulse dose of 80 fC. To study the modifications on the optical and chemical properties of these coatings under heat-treatments and corrosive and/or oxidative agents, complementary techniques were used: x-ray photoelectron spectroscopy, field-emission scanning electron microscopy, and UV-VIS spectroscopy. We have achieved nanometric rough carbon coatings with $SEY < 1$ for all primary energies. The photoemission quantum yield and the building up of surface charge under VUV pulsed irradiation were compared with a reference gold foil. Also Ni, Ag and Cr (< 20 nm) coated with carbon show a shift of their SEY curves (SEY versus primary energy) towards higher energies, in the 0-200 eV region of the first crossover energy for $SEY = 1$.

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Session Classification: Surface Science & Applied Surface Science

Track Classification: Surface Science & Applied Surface Science