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## Electromagnetic Characterisations of Non-Evaporable Getter Thin Films based on Waveguide Method

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Non-evaporable Getter (NEG) thin films have been widely used for ultrahigh vacuum applications, since the NEG coated vacuum chambers can function as a 'local distributed pump' after thermal activation. This is especially useful for conductance limited vacuum chambers, such as normally found at the particle accelerators. The NEG coated stainless-steel vacuum chambers have been used at the existing facility of synchrotron SIS18 at GSI to improve the vacuum performance of the synchrotron. The NEG coated chambers are also foreseen to be used for some of the vacuum chambers at the FAIR accelerator facility, such as at the synchrotron SIS100 and High Energy Storage Ring (HESR). This NEG coating was fabricated based on DC magnetron sputtering of Titanium, Zirconium, and Vanadium alloys and it was produced in-house at the Vacuum Group GSI. It is believed that the use of NEG coating may affect the beam impedance in a particle accelerator. This work aims to characterise the electromagnetic properties of the NEG coating at broadband frequencies, which are useful to investigate the effect of the NEG coating on the beam performance for a particle accelerator. The characterisation of the electromagnetic properties of NEG coating in this work is obtained from the combination of measurement and simulation of scattering parameters (S-parameters). The scattering parameters measurements are carried out using a vector network analyser at broadband frequencies (1-10 GHz), based on microstrip and coplanar waveguide methods. CST (Computer Simulation Technology) microwave studio is employed for simulation of the scattering parameters. The impedance as well as the conductivity of the NEG coating can then be determined from the measurement and simulation results of the S-parameters.

**Author:** SUHERMAN, Phe (GSI Helmholtzzentrum für Schwerionenforschung GmbH)

**Co-author:** BELLACHIOMA, Maria Cristina (G)

**Presenter:** SUHERMAN, Phe (GSI Helmholtzzentrum für Schwerionenforschung GmbH)

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