

Dynamic Saturation of TiZrV Non-Evaporable Getters (NEG) Vacuum Chambers

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Abstract

NEG chambers are 316L vacuum chambers coated with a TiZrV layer, widely used in accelerator systems.

This particular alloy works, when thermally activated, as a linear pump for almost all gas species inside the chamber: molecules are adsorbed on the surface or soaked up in the bulk. Acceptance tests of these chambers are provided with different manual gas injection tests in labs.

The purpose of this study is to predict and avoid the effect of the saturation of the NEG elementary pumping sites, usually provided by CO gas injections during the standard procedures of acceptance test.

For this reason, a time-dependent COMSOL® simulation has been used, working with the Molecular Flow Module in the free molecular flow regime ($Kn > 10$), which has underlined the saturation limits and what are the edges (time, pressure) where we can improve to have reliable tests, in order to best reproduce the real pumping limits inside the accelerators-NEG pipes.