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**Surface morphology, surface composition and outgassing behaviour of vacuum fired stainless steel**

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Stainless steel is one of the most used construction materials in vacuum technology. In order to reduce the outgassing of hydrogen a high temperature treatment (vacuum firing) is a common used method especially in XHV applications. There is a considerable body of experimental studies on outgassing of hydrogen from stainless steel and basically two models have been presented: the diffusion limited model and the recombination limited model. Since the recombination process is strongly related to surface morphology and composition, surface characterization has been performed by atomic force microscopy (AFM), scanning tunnelling microscopy (STM) and surface near composition has been studied by Auger electron spectroscopy and atom probe depth profiling analysis. After vacuum firing a significant change in surface morphology is observed by AFM and STM. The high temperature treatment leads to a complete reconstruction of the surface with wide closed packed terraces, atomic steps and facets formed by bunched steps. The atom probe depth profiling analysis results in a significant enrichment on Ni in the topmost layer, whereas Cr is found enriched in the second atomic layer. Since the gas surface interaction of hydrogen on Ni is very different to this on Fe consequences on the recombination mechanism have to be taken into account. These experimental results will generally be discussed within the present picture of outgassing of stainless steel. (Work supported by Zukunftsfonds des Landes Steiermark P 119).