

## RF플라즈마에 의한 마르텐사이트 스테인레스강의 질화에 관한 연구

Martensitic Stainless Steel Nitrided in a Low-Pressure  
rf Plasma

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We report a study of the nitriding of the martensitic grade of stainless steel AISI 420 in a low-pressure rf discharge using pure nitrogen. Much studied samples of the austenitic grade AISI 304 were treated at the same time to provide a comparison. With a treatment time of 4.0 h at 400°C, the nitrogen-rich layer on AISI 420 is 20 $\mu$ m thick and has a hardness about 4.3 times higher than that of the untreated material. The layer thickness is much greater than that obtained on AISI 304 under identical treatment conditions, reflecting the different Cr content of the two alloys. The alloy AISI 420 is more susceptible than AISI 304 to the formation of CrN and ferrite, and this has a deleterious effect on the hardness gain. Below the temperature at which CrN forms, the treated layer retains its martensitic structure, but with a larger lattice parameter than the bulk, a phase that we term expanded martensite, by analogy with the situation with austenitic stainless steel. The fact that the treated layer retains a martensitic structure is interesting in view of previous evidence that nitrogen is an austenite stabilizer.

## References

1. Y. Sun et al., *Wear*, 178(1994)131.
2. K.-T. Rie et al., *MRS Bull.*, 21(1996)46.