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Surface segregation of NiZr and CuZr alloys.

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The surface segregation of NiZr, CuZr alloy has been studied with X-ray photoelectron spectroscopy(XPS), Auger electron spectroscopy(AES) and low energy ion scattering(LEIS). The composition of outmost atomic layer has been determined by the use of LEIS at several incident energies using Ar⁺ ion. In the LEIS analysis, the effect of charge exchange has been estimated by a novel measurement of the charge exchange parameters while simultaneously determining the relative concentrations of Ni and Zr and the complementary information obtained will be described. The composition of the clean annealed surface, measured with AES only, will be contrasted with the surface concentration of the preferentially sputtered surface. The experimental results have clearly demonstrated that when the NiZr and CuZr alloys are exposed to continuous Ar⁺ ion bombardment the outermost atomic layer is Zr rich due to preferential sputtering of Ni atoms, where Ni is preferentially sputtered, but the difference in sputtering yields is not sufficient to explain the observed composition. Therefore, it is necessary to consider other processes such as Radiation Induced Segregation(RIS). The surface composition of the heated sample surface predicts that Zr should surface segregate which further supports the view that part of the Zr enrichment is due to RIS.