Title: Heat Transfer and Corrosion Resistance of Ni-W-P Coating under Supercritical Water

Abstract: As the post-processing method of equipment and tubes is seldom used in the field of super-critical water (SCW), as well as the high cost and low heat transfer performance of some of the materials, more up-to-date methods were developed to inhibit oxidation of SCW. In this work, the ternary Ni-W-P coating was deposited on the sample surface. Structure and composition of ternary Ni-W-P coating were profoundly analyzed with scanning electron microscopy (SEM), energy disperse spectroscopy (EDS) and X-ray diffraction (XRD). Additionally, thermal conductivity meter was specially employed to study the performance of heat transfer behavior, by means of heat-resistance method. After oxidation of SCW, amorphous Ni-W-P coating crystallizes to some extent and oxidation resistance of coating can be convincing. Nevertheless, the diffusion of metal cations and the growth of oxides are the vital factors inhibiting the oxidation of SCW. Furthermore, the thermal conductivity of ternary Ni-W-P coating decreases with the increase of tungsten content and the coating unquestionably shows better heat transfer performance in the field of nuclear waste disposal and transport.