Tungsten was considered as one of the armors for plasma facing components. Vacuum plasma sprayed coatings is a suitable integration way of the armor to the heat sink, because it overcomes the disadvantage of poor workability and heavy weight. In order to alleviate the thermal stresses, W/Cu functionally graded materials were also developed at ASIPP.

Tungsten coatings with 1mm were deposited on the CuCrZr substrate by means of vacuum plasma spraying technology. The high quality coating was achieved: thermal conductivity of 79.7 W/m.K at RT, low porosity of 4.7% and high density of 17.73g/cm^3. On the other hand, W/Cu functionally graded material was also studied as a choice for plasma facing component.

The thermal performances of W/Cu mock-ups were evaluated by means of heat flux load of 1-10MW/m^2, or were exposed to edge plasma. Screening tests found that VPS W coating with actively cooling can withstand the heat flux of 8MW/m^2, under the higher power density the crack appeared, however, in the interface the coating was faultless. The plasma exposure experiment indicated that the graded layers can efficiently alleviate the thermal stresses. Meanwhile, the distribution of temperature and stress analyses was performed by means of ANSYS code.