Iron Aluminide coatings for supercritical steam turbine applications by TG-Mass Spectrometry

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A way to achieve a good corrosion protective layer on 9-12%Cr ferritic/martensitic steels is by aluminizing it by means of CVD-FBR technology. An iron aluminide coating is formed on the steel surface which has excellent oxidation and corrosion resistance, with lower rates of attack than ferritic heat resistant materials.

This CVD-FBR coating technique, is very attractive to be applied on this kind of material, since the aluminization is possible below 714°C, temperature that means important microstructural changes and loss in mechanical properties during the coating process could be avoided.

In order to study the volatilisation process of coated ferritic/martensitic steels in SCT (supercritical steam turbines environments), TG-Mass spectrometry studies have been develop to know the main species, forming the coating, that volatilises preferentially. This study jointly with thermodynamic calculations have been done to establish steam oxidation mechanism based in validated thermodynamic calculations and experimental results.