Conclusions

1. The WC-Ni coatings have a layered structure in which is dispersed about 20% volume fraction of WC and an overall carbon content of 2.3wt.%. The original starting powder had 75% volume fraction of WC with a metallic nickel coating and a total carbon content of about 5wt.%. Thus during spraying WC is taken into solution and about half the carbon is lost by oxidation to CO or CO 2.
2. The metallic binder of the coatings consists of layers composed of chiefly two basic structural types: nickel rich material with a grain size of 10–100nm and a FCC crystal structure with a lattice parameter larger than that of nickel, tungsten rich nanocrystalline material with a grain size less than 10nm. Dispersed within this material there were sometimes small crystals of tungsten and W_2C.
3. The clearly contrasted coating layers were composed of different amounts of these two structural features and the overall composition of the binder was calculated to be 56wt.%W, 43wt.%Ni and 1wt.%C.

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