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| **Abstract:** |  |
| Spark plasma sintering (SPS) is a powerful technique for consolidating metal powders at a remarkably shorter time with excellent quality. We used this technique for sintering nanocrystalline WC10Co powders and simultaneously bonding with high-strength steel. A series of experiments were conducted in order to find out the optimised set of SPS controlling parameters. The effects of temperatures (1000 to 1150 °C, with a 50 °C interval) in sintering nanocrystalline WC10Co powders and their bonding phenomena with AISI4340 steel were examined at a constant pressure of 80 MPa and a holding time of 5 min. The full density of the carbide powders was achieved at a lower temperature compared with that of conventional techniques. A number of techniques were employed to evaluate the microstructural characteristics of WC and steel bilayered composite and their mechanical properties. For determining the bonding strength of the joint, a novel micro-tensile testing system was adopted. Since such investigation is the first of its kind, to the best knowledge of the authors, where SPS is used to join the tungsten carbide with the steel, this research is expected to provide a valuable future reference for fabricating dissimilar bilayered composite materials. | |