|  |  |  |  |
| --- | --- | --- | --- |
| **Title:** | Influence of sintering time on diffusion bonding of WC-10Co and AISI4340 by spark plasma sintering | | |
| **Author(s) Name:** | Mahadi Hasan, Md. Ashraful Islam, Zhenyi Huang, Jingwei Zhao & Zhengyi Jiang | | |
| **Contact Email(s):** | mahadi@aiub.edu | | |
| **Published Journal Name:** | Materials Science and Technology | | |
| **Type of Publication:** | Journal | | |
| **Volume:** | 39 | Issue | 6 |
| **Publisher:** | Taylor and Francis | | |
| **Publication Date:** | Oct 16, 2022 | | |
| **ISSN:** | 1743-2847 | | |
| **DOI:** | 10.1080/02670836.2022.2132732 | | |
| **URL:** | https://www.tandfonline.com/doi/full/10.1080/02670836.2022.2132732 | | |
| **Other Related Info.:** | Page 683-693 | | |
|  | | | |

|  |  |
| --- | --- |
| **Abstract:** |  |
| It is challenging to obtain successful bonding between cemented tungsten carbide and steel due to the large differences in their physical and mechanical properties. We used spark plasma sintering (SPS) technique and successfully bonded WC-10Co and AISI4340 high-strength steel at a low temperature. The effects of sintering time (5–20 min with a gap of 5 min) on their diffusion bonding were examined. The microstructure of the bonded composite materials was evaluated, and formed phases were identified. The mechanical properties were investigated, and the importance of processing parameters of SPS was discussed. The results show a crackfree continuous metallurgical bonding achieved at 1000°C, and the bonding strength increased with increasing holding times of 5, 10, 15, and 20 min. The sintered WC-10Co powders obtained nearly full density (99.07%) with an average maximum hardness of 1763 HV5. A special arrangement was used to determine the tensile bonding-strength with maximum average of 152 MPaat 20 min. | |