

Accepted Manuscript

Laser-induced precipitation of $(W_{1-x}Cr_x)_2C$: mixed carbide phase for improved wear resistance of thermally sprayed hardmetal coatings

Leo Janka, Jonas Norpoth, Christian Tomastik, Ville Matikainen, Petri Vuoristo

PII: S0257-8972(17)31292-6
DOI: doi:[10.1016/j.surfcoat.2017.12.061](https://doi.org/10.1016/j.surfcoat.2017.12.061)
Reference: SCT 22979

To appear in: *Surface & Coatings Technology*

Received date: 19 September 2017
Revised date: 30 November 2017
Accepted date: 26 December 2017



Please cite this article as: Leo Janka, Jonas Norpoth, Christian Tomastik, Ville Matikainen, Petri Vuoristo, Laser-induced precipitation of $(W_{1-x}Cr_x)_2C$: mixed carbide phase for improved wear resistance of thermally sprayed hardmetal coatings, *Surface & Coatings Technology* (2017), doi:[10.1016/j.surfcoat.2017.12.061](https://doi.org/10.1016/j.surfcoat.2017.12.061)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Laser-induced precipitation of $(W_{1-x}Cr_x)_2C$: mixed carbide phase for improved wear resistance of thermally sprayed hardmetal coatings

Leo Janka^{a,b,*}, Jonas Norpoth^a, Christian Tomastik^a, Ville Matikainen^b,
Petri Vuoristo^b

^aAC2T research GmbH, Viktor Kaplan-Str. 2 C, A-2700 Wiener Neustadt, Austria

^bLaboratory of Materials Science, Tampere University of Technology, Korkeakoulunkatu 6, FI-33101 Tampere, Finland

Abstract

The mixed hemcarbide phase $(W_{1-x}Cr_x)_2C$ is introduced in this work as an appropriate substitute for the pure tungsten carbide WC in thermally sprayed hardmetals acting as wear resistant coatings for various industrial applications. Dedicated laser post-treatments turn out to be most suitable means to precipitate the desired mixed carbide phase from the binder matrix of Cr_3C_2 -37WC-NiCoCrFe coatings, which is left after spraying with considerable degree of supersaturation with excess tungsten, chromium and carbon from spraying-induced carbide dissolution. Major improvements of the coatings resistance against abrasive wear under high-stress conditions at room temperature and at 800 °C as well as under low-stress ASTM G65 conditions can be attained by the laser post-treatments, so that the performance of industrial benchmark coatings of WC-10Co4Cr and Cr_3C_2 -25NiCr can be nearly met or surpassed respectively.

Keywords: $(W,Cr)_2C$, mixed carbide, tungsten carbide, chromium carbide, hardmetal, thermal spray, laser treatment, abrasive wear

*Corresponding author

Phone: +43 2622 81600 156

Fax: +43 2622 81600 99

Email address: leo.janka@ac2t.at (Leo Janka)

Download English Version:

<https://daneshyari.com/en/article/8024261>

Download Persian Version:

<https://daneshyari.com/article/8024261>

[Daneshyari.com](https://daneshyari.com)