

Effect of deposition parameters on micro- and nano-crystalline diamond films growth on WC-Co substrates by HFCVD

Objective

Monitor the morphological properties of diamond films made at different temperature. The grain size of the samples was determined by the AFM.

Sample preparation

WC-Co substrates were chemically etched in two steps, then diamond nanoparticles were grounded and cleaned, after that diamond films were deposited by HFCVD at different conditions of pressure and temperature (in the table below) according to the Taguchi Method.

Data acquisition conditions

Atomic force microscope (AFM, NanoScopella) was used.

The temperature and pressure have notable effects on grain size, on the picture is shown that grain size is proportional to temperature.

Table 1 Experimental layout using $L(3 \times 3)$ orthogonal array

Sample No.	$t/^{\circ}\text{C}$	p/kPa	$x/\%$
A	930 ± 10	1.3	2.5
B	930 ± 10	3.9	3.5
C	930 ± 10	5.2	5.0
D	810 ± 10	1.3	3.5
E	810 ± 10	3.9	5.0
F	810 ± 10	5.2	2.5
G	650 ± 10	1.3	5.0
H	650 ± 10	3.9	2.5
I	650 ± 10	5.2	3.5

Representative figure /results

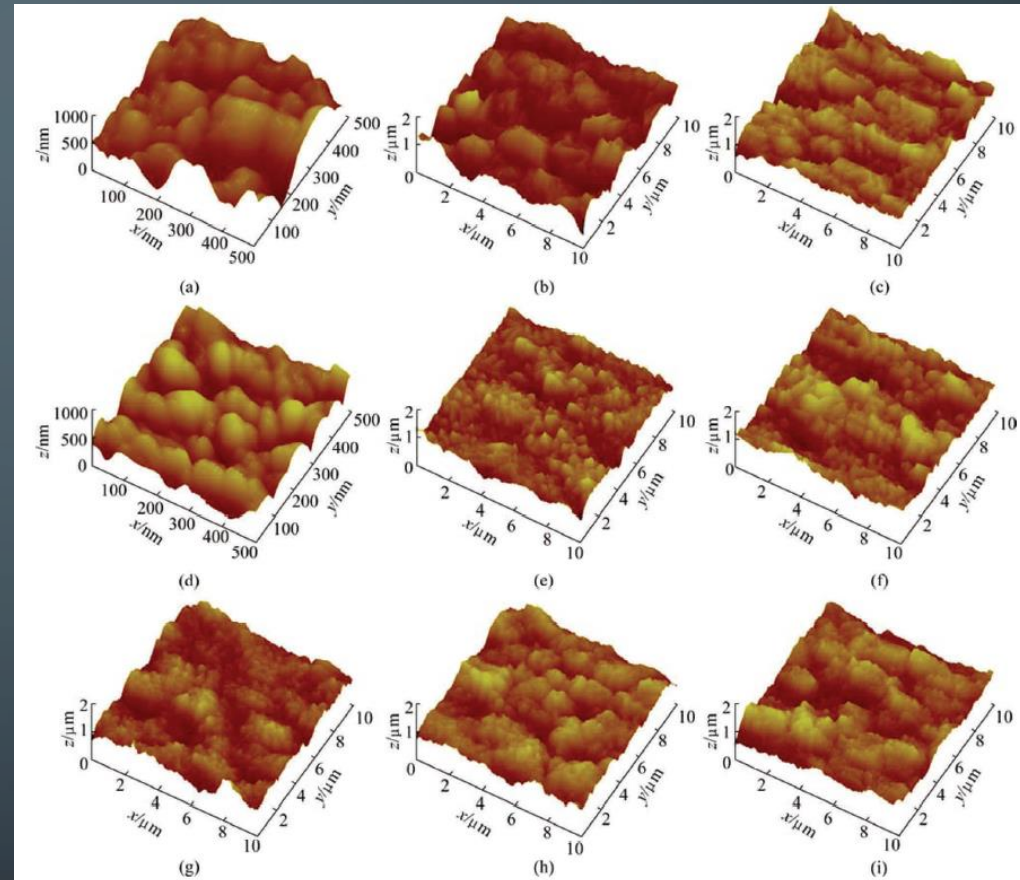


Fig. 3 AFM image of samples: (a) Sample A; (b) Sample B; (c) Sample C; (d) Sample D; (e) Sample E; (f) Sample F; (g) Sample G; (h) Sample H; (i) Sample I

Reference

J. guo ZHANG, X. chang WANG, B. SHEN, and F. hong SUN, "Effect of deposition parameters on micro- and nano-crystalline diamond films growth on WC-Co substrates by hfcvd", Transactions of Nonferrous Metals Society of China, vol. 24, no. 10, pp. 3181-3188, 2014, issn: 1003-6326. doi: [https://doi.org/10.1016/S1003-6326\(14\)63458-0](https://doi.org/10.1016/S1003-6326(14)63458-0). [Online]. Available: <http://www.sciencedirect.com/science/article/pii/S1003632614634580>.

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