

# Friction and Wear Properties of CN<sub>x</sub> Coatings in The Flow of N<sub>2</sub> gas

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The CN<sub>x</sub> coatings of 100 nm thickness are formed on the Si<sub>3</sub>N<sub>4</sub> balls (r=4mm) and Si<sub>3</sub>N<sub>4</sub> disks by the deposition of evaporated carbon and the mixing of N ion. The coating have the amorphous structure and the chemical composition of 87-88% of carbon and 12-13% nitrogen with the hardness of 25-30GPa.

Under the load of 200-400mN and at the sliding velocity of 0.4m/s, the friction coefficient between the CN<sub>x</sub> coating on the ball and the disk is about 0.2-0.4 in air of 25-30%RH and is below 0.02 in the flow of N<sub>2</sub>-gas supplied to the sliding interface at the flow rate of 3.6 l/min through a pipe of 4.5 mm diameter in air.

The wear rate of CN<sub>x</sub> coating on the ball is in the order of 10<sup>-8</sup> - 10<sup>-9</sup> mm<sup>3</sup>/Nm which is in the similar order of diamond sliding on diamond in humid air.

The mechanisms of low friction and low wear observed with CN<sub>2</sub>/CN<sub>x</sub> contact in the flow of N<sub>2</sub>-gas are analyzed and discussed by the chemical analysis and the electron microscopic analysis of wear surfaces.