

SUMIDIA Binderless

M39 to M41

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SUMIDIA
Binderless

SUMIDIA

SUMIDIA
Binderless

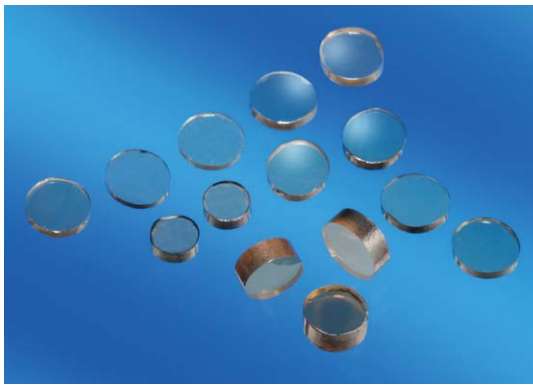
SUMI
CRYSTAL

SUMIDIA
Binderless

 Nano-Polycrystalline Diamond Tool / SUMIDIA Binderless ...M40
 MOLD FINISH MASTER / SUMIDIA Binderless Ball-nose Endmills NPDB Type...M41

M39

SUMIDIA Binderless



General Features

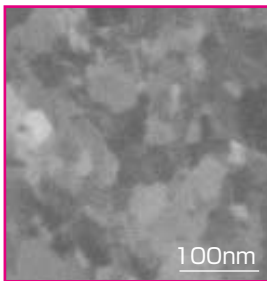
SUMIDIA Binderless is polycrystalline diamond that directly binds nano-order diamond particles with high strength without using any binders. SUMIDIA Binderless is harder than single-crystal diamond and has no cleavability. Therefore, it enables machining of hard, brittle material such as carbides and makes possible new machining methods.

Characteristic

- SUMIDIA Binderless is a pure diamond, but, unlike single-crystal diamonds, has no anisotropy. Therefore, it displays excellent wear resistance with less uneven wear.
- Thanks to its polycrystalline structure, SUMIDIA Binderless has no cleavability peculiar to single-crystal diamonds and displays excellent fracture resistance.

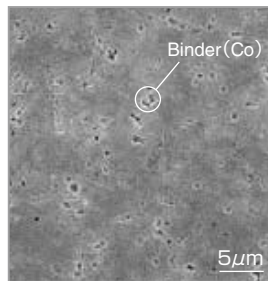
Comparison of Structures

SUMIDIA Binderless SEM Image



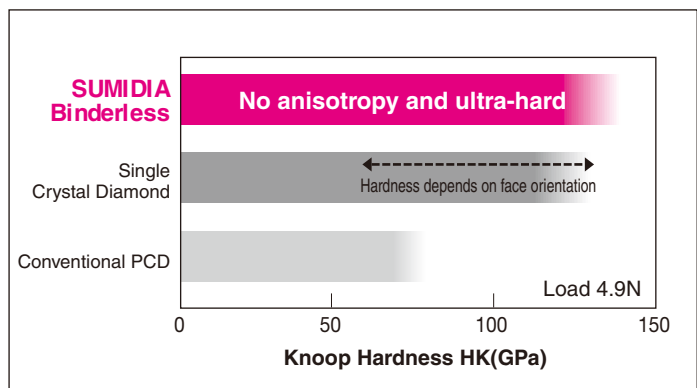
Diamond Grains (30 to 50nm)

Conventional PCD SEM Image



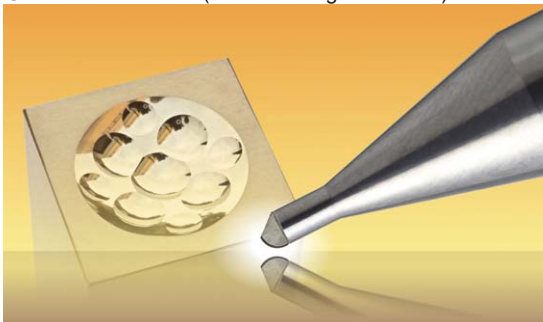
Diamond Grains (1 to 10µm)

Hardness



Application Examples of SUMIDIA Binderless

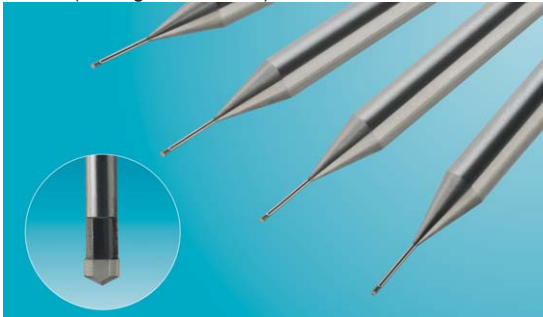
Ballnose Endmill (Direct Cutting of Carbide)



Indexable Insert (Turning of Carbide)



Drill (Drilling of Ceramics)



Cutting Tool (Ultra-Precision Cutting of Carbide)





NPDB Type Stock Page 

■ General Features

The NPDB type enables direct mirror finishing of carbide, which is impossible for existing single-crystal or polycrystalline diamonds, by employing nanopolycrystalline diamond, which is harder than single-crystal diamond, for the cutting edge.

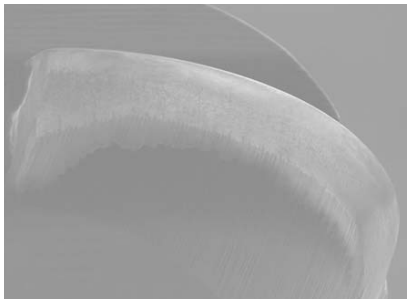
■ Characteristic

● Ideal for Finishing of Hard, Brittle Materials Including Carbide

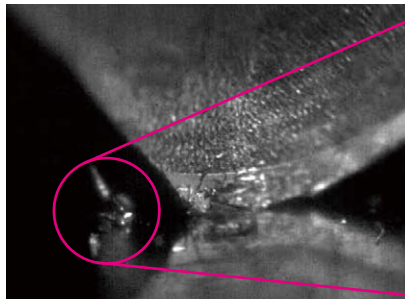
Provides excellent machined surface quality thanks to the sharp cutting edge and optimized edge treatment.

● Enables High-Precision Machining and Achieves Long Tool Life

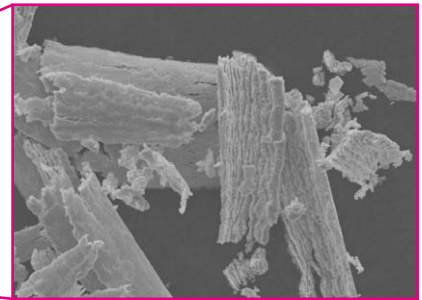
Maintains excellent dimensional accuracy for a long time thanks to the high contour accuracy of the cutting edge and the excellent wear resistance of diamonds.



Close-up of Cutting Edge





Direct Cutting of Carbide



Chip (Close-up)

■ Application Example

Application to Optical Use (Fly-Eye Lens Mold)	Application to Medical Use (μ -TAS Mold)
	
<p>Work Material : Carbide AF1 (Ultra-fine Grain Carbide) Finishing Tool : SUMIDIA Binderless R0.5 Ballnose Endmill (Finishing) (Roughing: R0.5 Diamond-Coated Endmill, 55 minutes) Finishing Time : 2 hours 40 minutes Finishing Conditions : $n = 60,000 \text{ min}^{-1}$ $v_f = 300 \text{ mm/min}$ $p_f = 0.005 \text{ mm}$ Oil Mist Surface Roughness : Ra0.015μm</p>	<p>Work Material : Carbide AF1 (Ultra-fine Grain Carbide) Finishing Tool : SUMIDIA Binderless R0.3 Ballnose Endmill Finishing Time : 1 hour 28 minutes Finishing Conditions : $n = 38,000 \text{ min}^{-1}$ $v_f = 95 \text{ mm/min}$ Machining Allowance=0.003mm $p_f = 0.001 \text{ mm}$ Wet(Oil based) Cutting Length=8.3m Surface Roughness : Ra0.016 to 0.020μm</p>