

SUMIDIA Binderless

M39 to M41

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SUMIDIA
Binderless

SUMIDIA

SUMIDIA
Binderless

SUMICRYSTAL

SUMIDIA
Binderless

 Nano-Polycrystalline Diamond Tool / SUMIDIA Binderless ...M40

 MOLD FINISH MASTER / SUMIDIA Binderless Ball-nose Endmills NPDB Type...M41

SUMIDIA Binderless



General Features

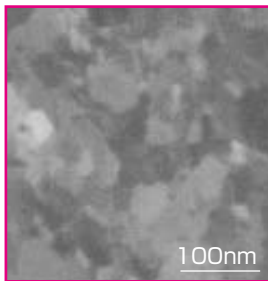
SUMIDIA Binderless is a polycrystalline diamond that directly binds nanometer-level diamond particles with high strength without using binders. SUMIDIA Binderless is harder than single-crystal diamond and has no cleavability. Therefore, it enables machining of hard brittle materials such as carbides and enables 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.

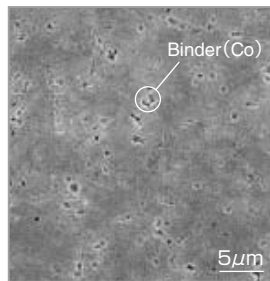
Comparison of Structures

SUMIDIA Binderless
SEM Structure



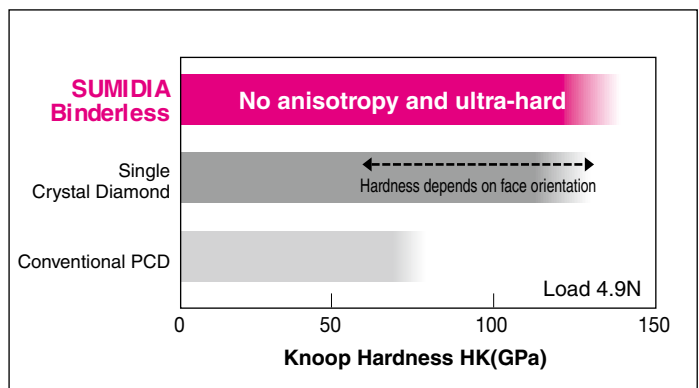
Diamond Grains
(30 to 50nm)

Conventional PCD
SEM Structure



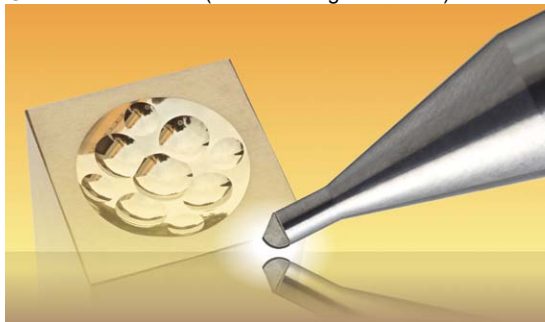
Diamond Grains
(1 to 10 μ m)

Hardness



Application Examples of SUMIDIA Binderless

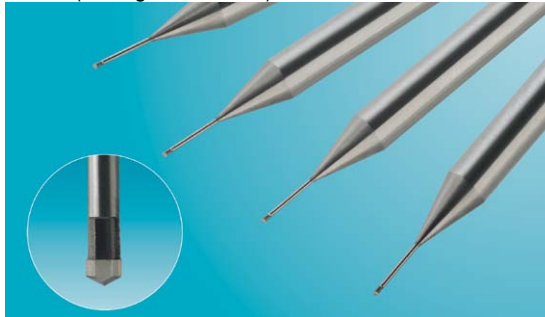
Ballnose Endmill (Direct Cutting of Carbide)



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.

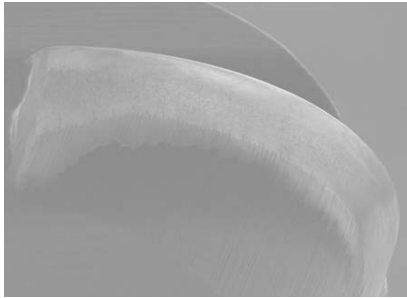
■ Characteristic

● Ideal for Finishing of Hard, Brittle Materials Including Carbide

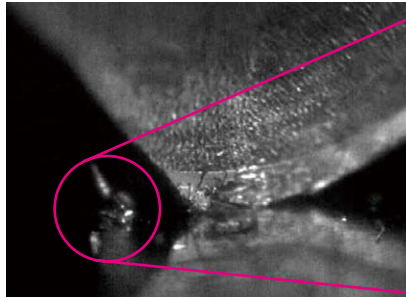
Provides excellent machined surface quality thanks to the sharp cutting edge and optimized edge treatment.

● Enables High-Precision Machining and Achieves Long Tool Life

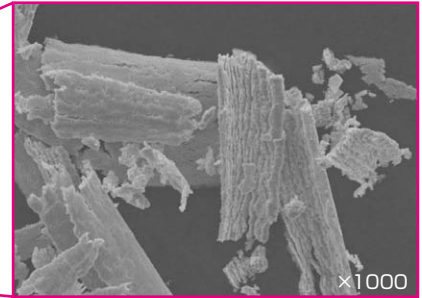
Maintains excellent dimensional accuracy for a long time thanks to the high contour accuracy of the cutting edge and the excellent wear resistance of diamonds.



Close-up of Cutting Edge





Direct Cutting of Carbide



Insert (Close-up) ×1000

■ 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)</p> <p>Finishing Tool : SUMIDIA Binderless R0.5 Ballnose Endmill (Finishing) (Roughing: R0.5 Diamond-Coated Endmill, 55 minutes)</p> <p>Finishing Time : 2 hours 40 minutes</p> <p>Finishing Conditions : $n=60,000\text{min}^{-1}$ $V_f=300\text{mm/min}$ $P_f=0.005\text{mm}$ Oil Mist</p> <p>Surface Roughness : Ra0.015μm</p>	<p>Work Material : Carbide AF1 (Ultra-fine Grain Carbide)</p> <p>Finishing Tool : SUMIDIA Binderless R0.3 Ballnose Endmill (Roughing and Finishing)</p> <p>Finishing Time : 1 hour 28 minutes</p> <p>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</p> <p>Surface Roughness : Ra0.016 to 0.020μm</p>