

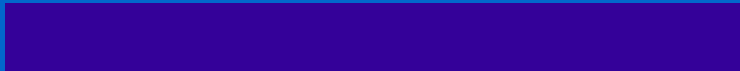


Toyo Tanso USA



Ion Implant Presentation

May 2002



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Ion Implant

- Varian - High Energy (Kestrel 750)



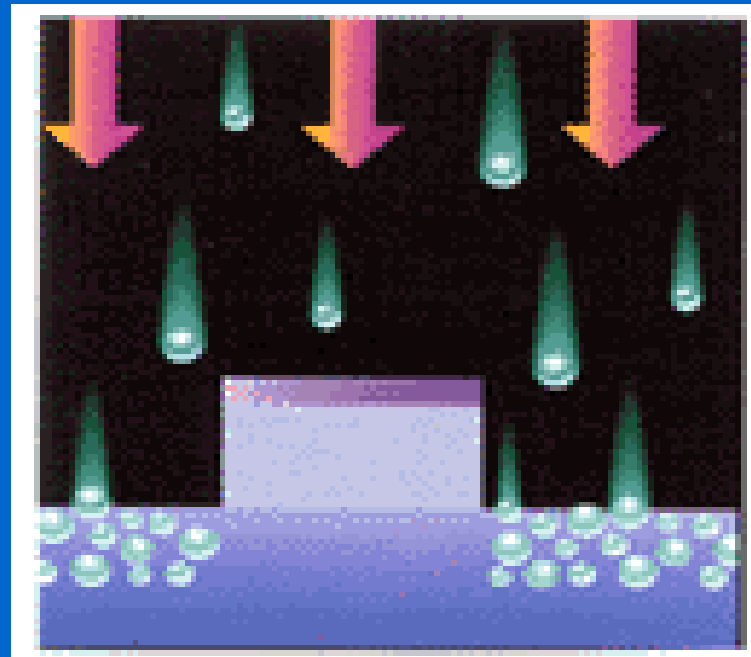
Ion Implant

- OEM's
 - Eaton/Axcelis
 - GSD80/200/HE,NOVA10/20/60/108
 - Varian
 - E-200/500,VIIsion80/220,Genus20/750/1500
 - Applied Material
 - 9200,9500,xR80
 - Others

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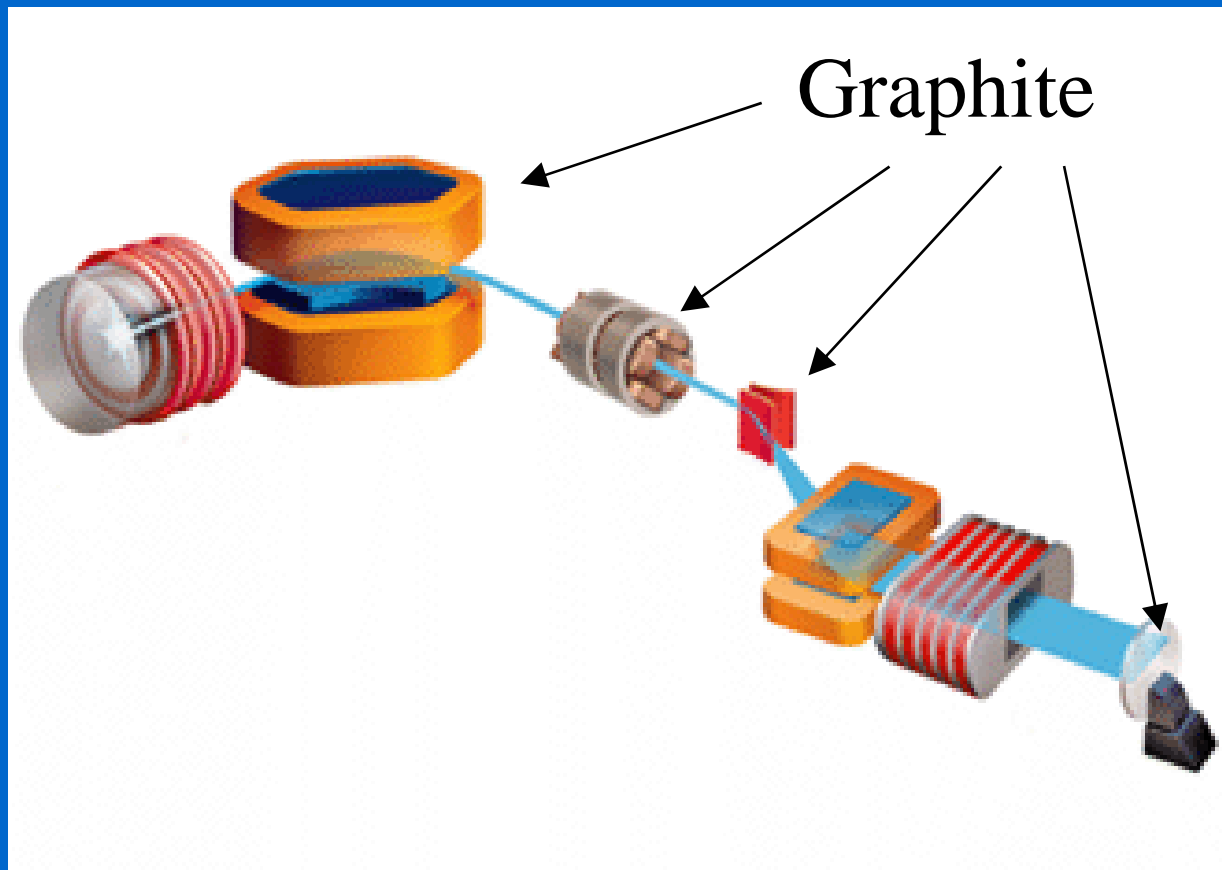
Ion Implant

- Ion Implant process



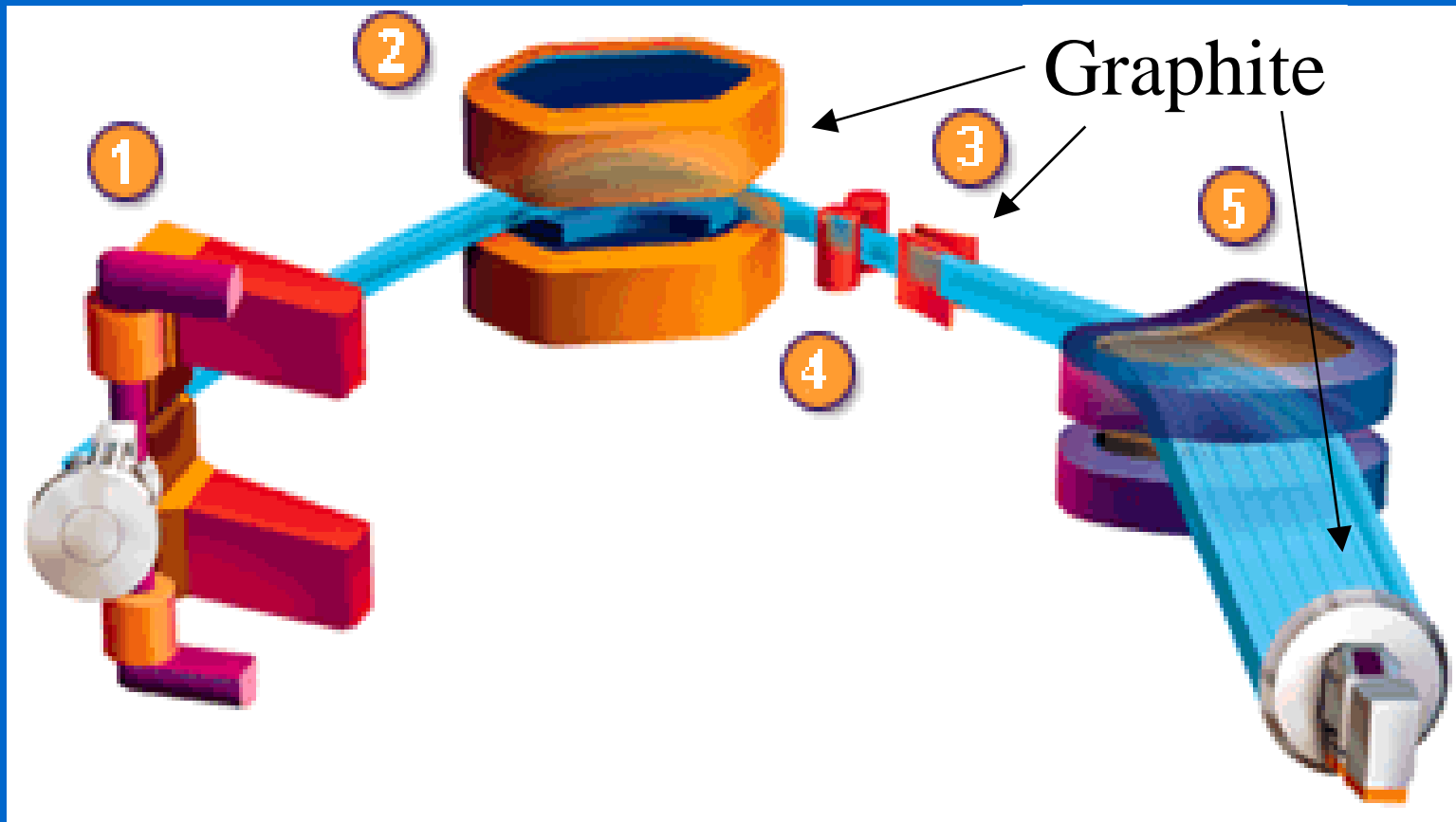
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Ion Implant



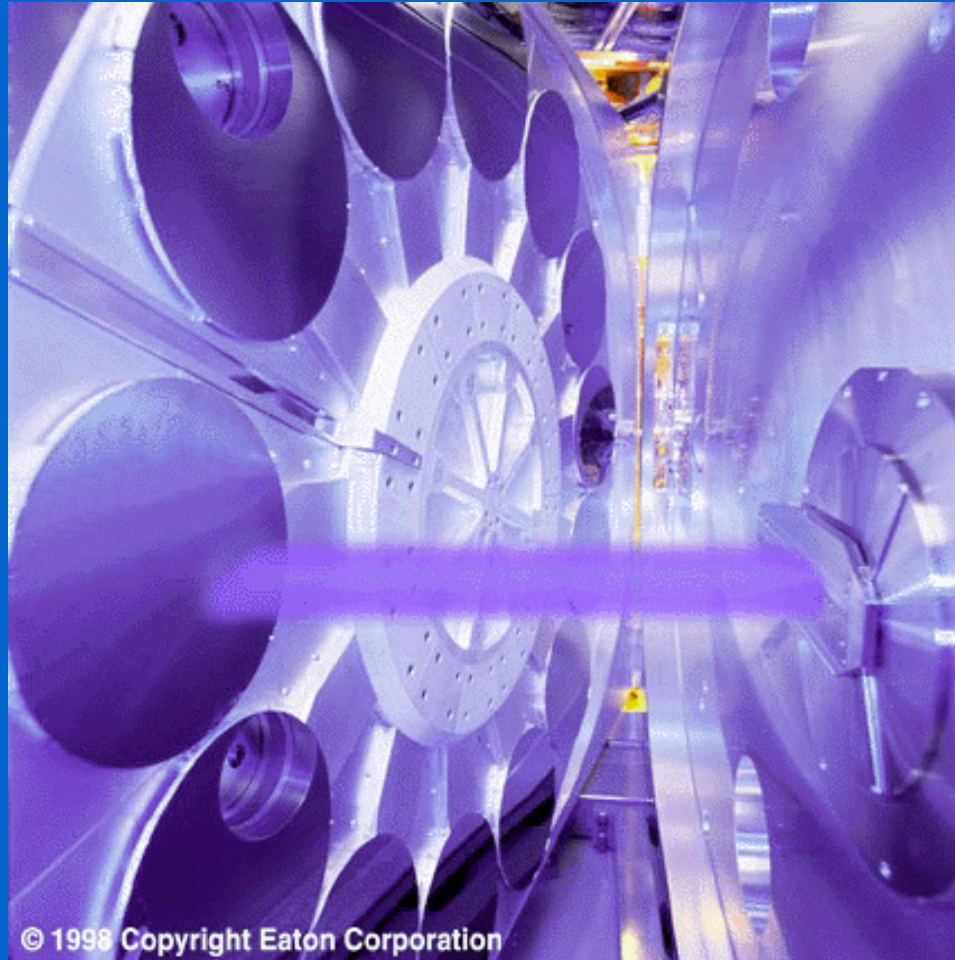
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Ion Implant



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Ion Implant



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Ion Implant

- Graphite Parts
 - Beam Aperture, Flag Faraday, Electrode Spacer, Strike Plate, Plate Aperture, Ground Electrode

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Ion Implant

- Beam Damp Aperture



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Ion Implant

- First Defining Aperture



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Ion Implant

How is graphite produced

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Ion Implant

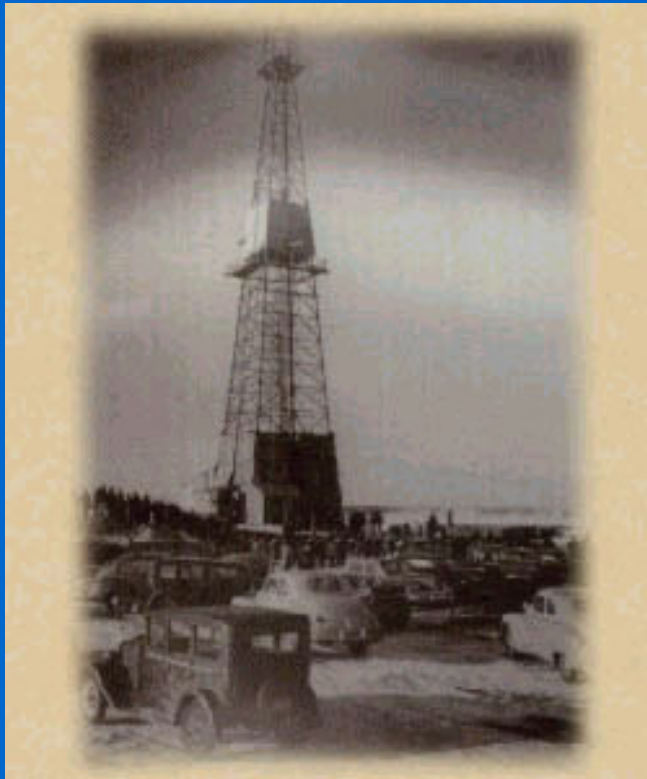
Not this graphite



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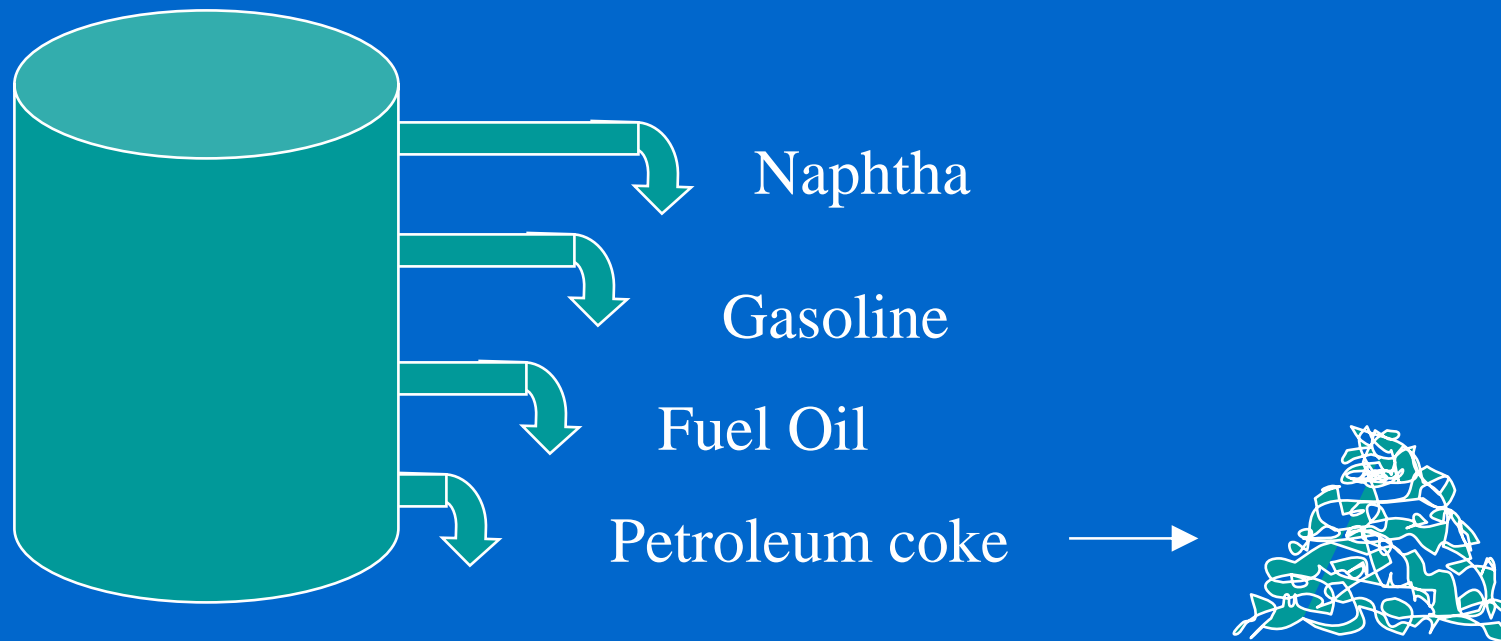
Ion Implant

- Crude Oil



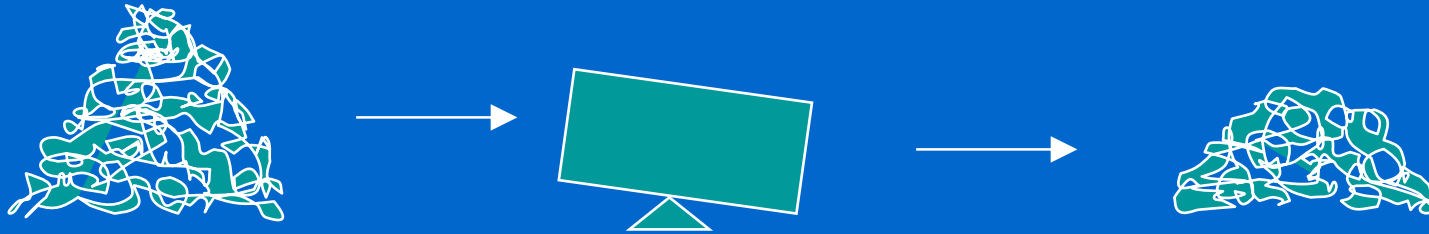
Ion Implant

- Crude oil refined into petroleum coke



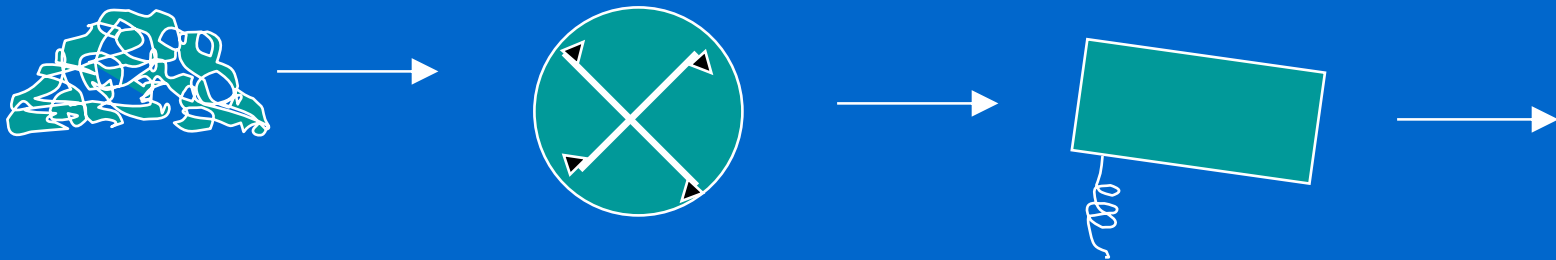
Ion Implant

- Raw Petroleum Coke
 - placed in a Calciner at 1300C
 - produces Calcined petroleum coke



Ion Implant

- Calcined petroleum coke
 - place large chunks of coke into a hammer mill



- place small particles into a vibrating screen

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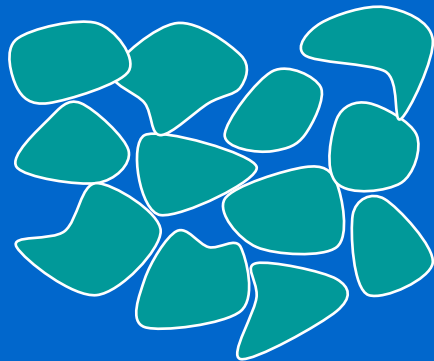
Ion Implant

- Sized Calcined petroleum coke

Coarse



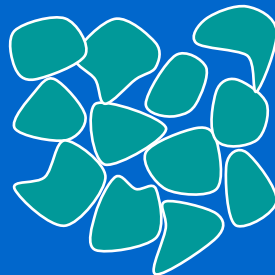
20 micron



Intermediate



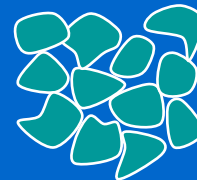
10 micron



Fine



5 micron



Flour



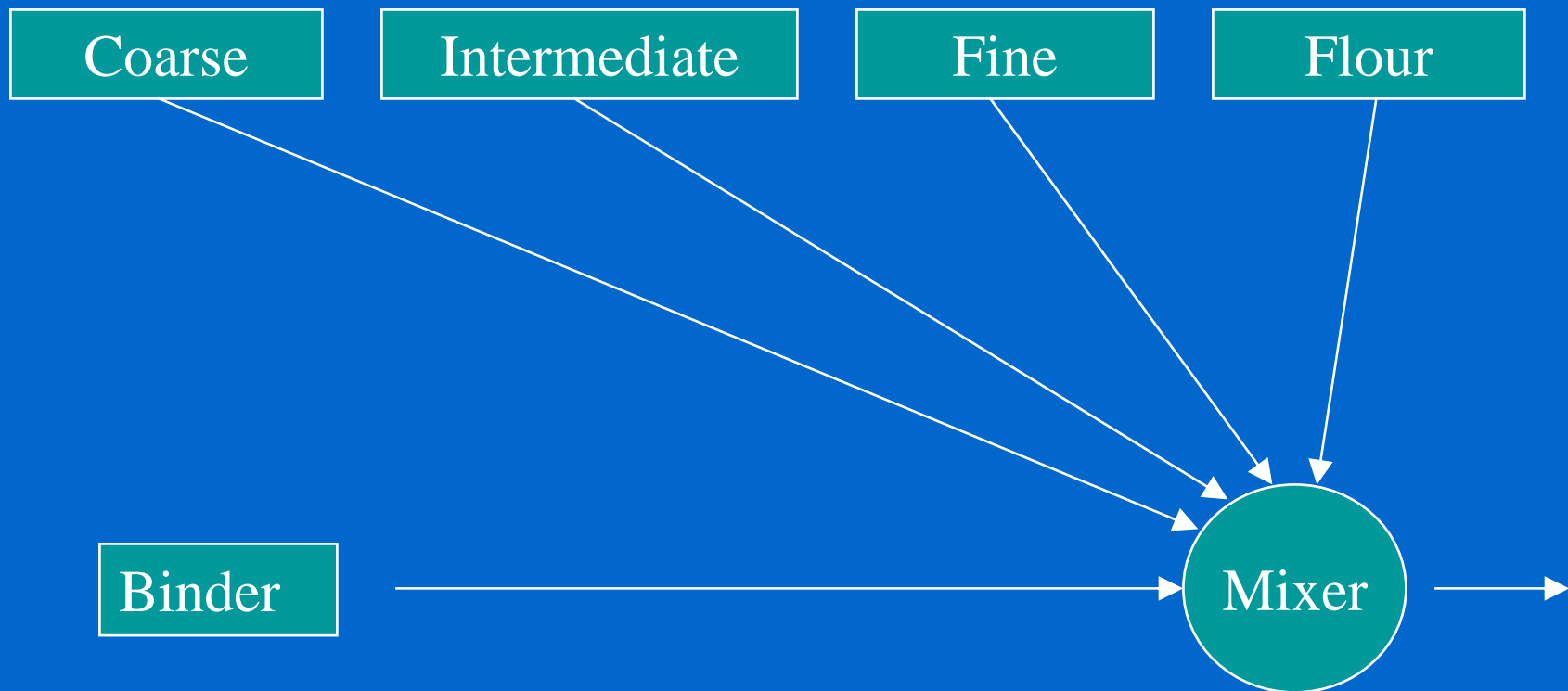
1 micron



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Ion Implant

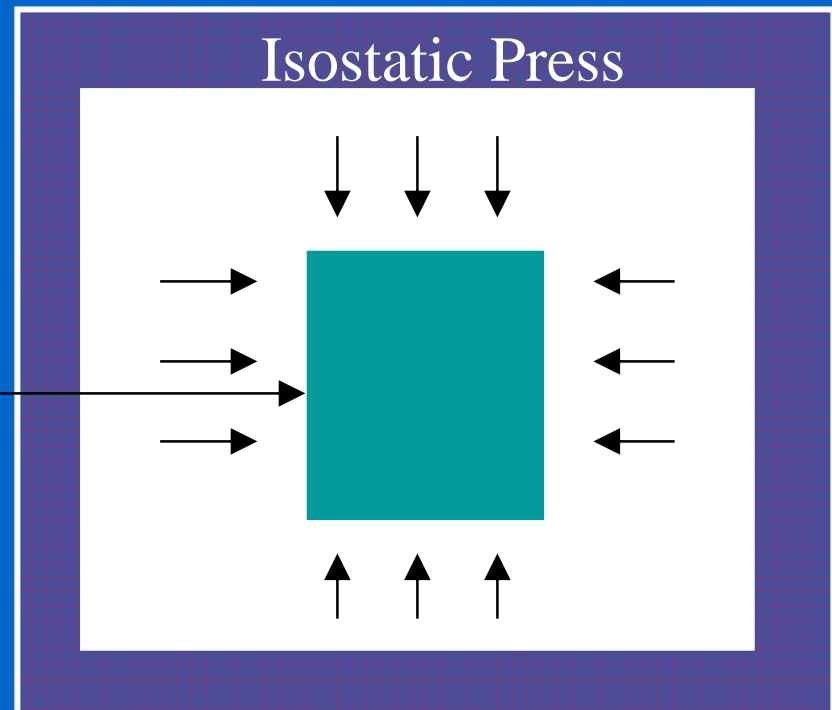
- Sized Calcined petroleum coke



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Ion Implant

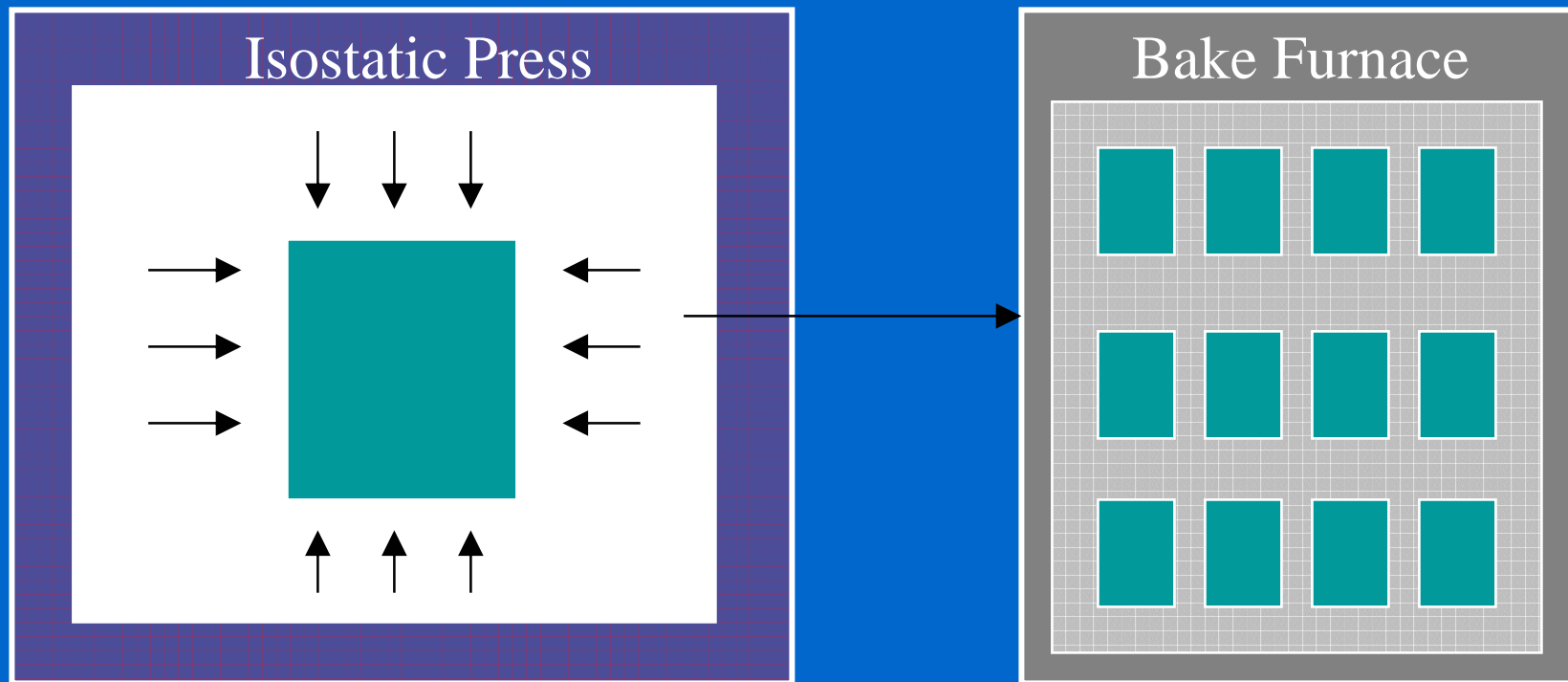
- Placed green billets into Isostatic Press



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Ion Implant

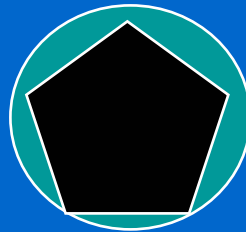
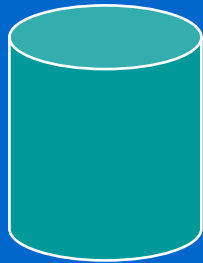
- Molded Amorphous Graphite placed into Bake Furnace



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Ion Implant

- Coal Tar Pitch
 - Coal Tar Pitch is Pulverize

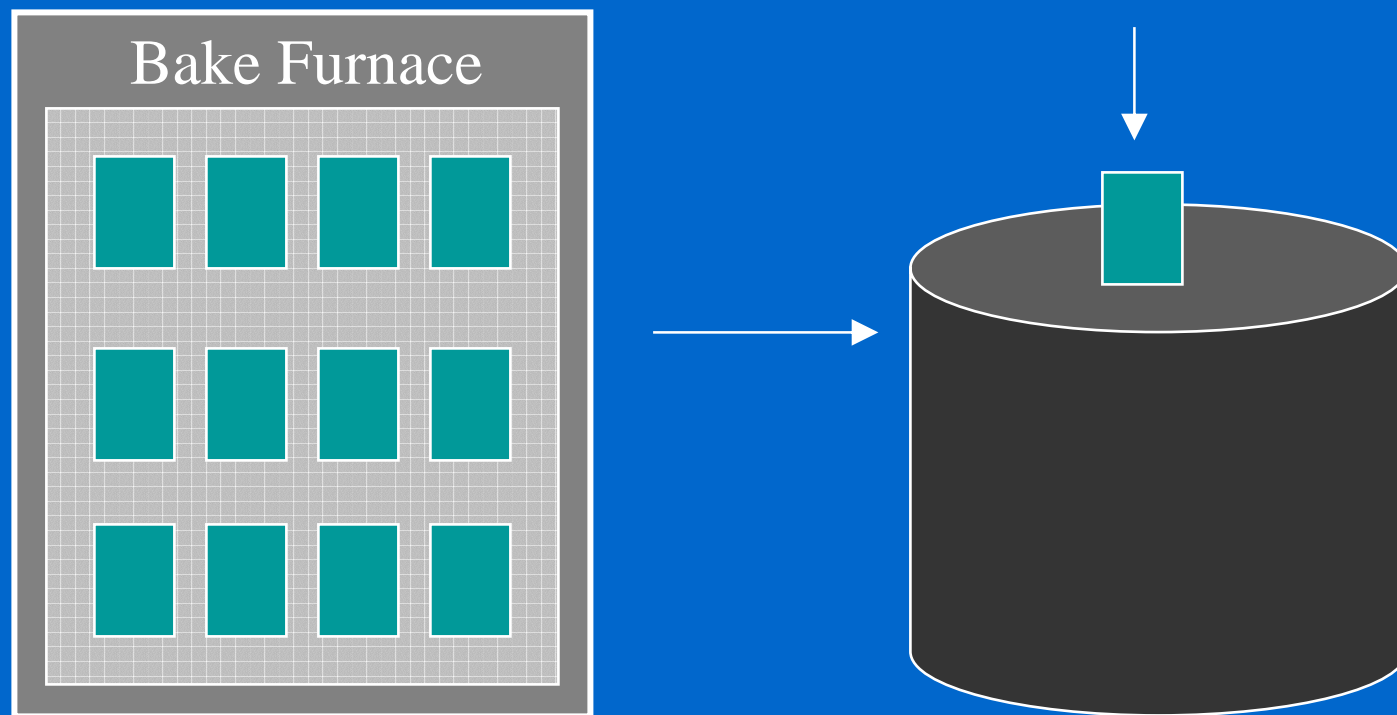


Pulverized Coal Tar Pitch

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Ion Implant

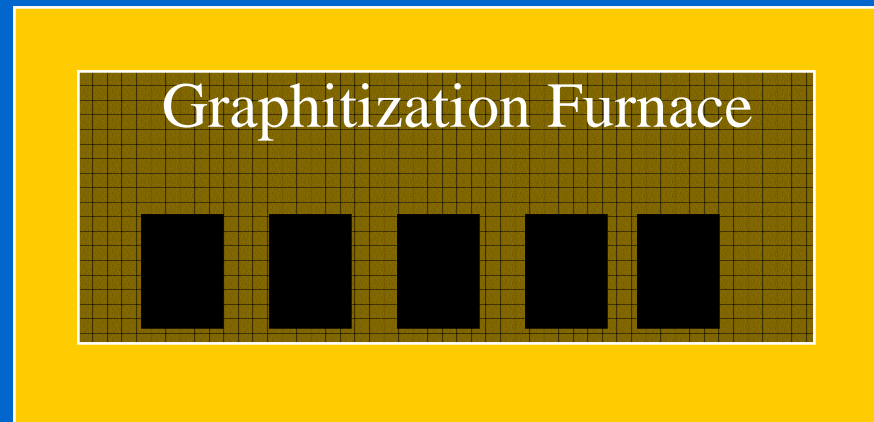
- Amorphous Carbon is Impregnated with Pitch



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Ion Implant

- Amorphous carbon blocks are placed in a Graphitization Furnace



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Ion Implant

- Basically three types of Carbon
 - Amorphous Carbon
 - Graphite
 - Diamond

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Ion Implant

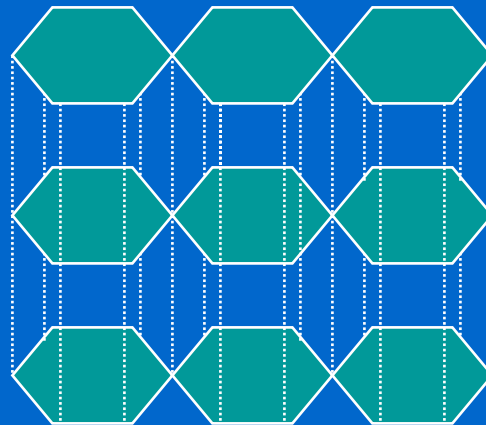
- Amorphous Carbon - not structure



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Ion Implant

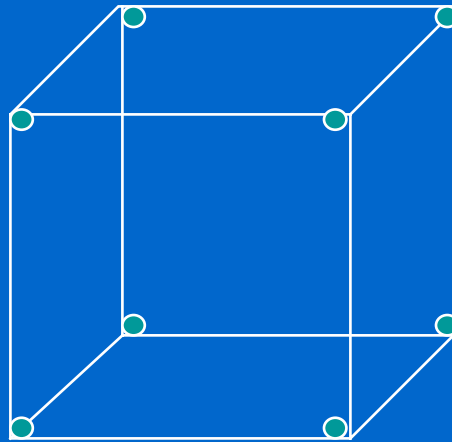
- Graphite or hexagonal structure



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Ion Implant

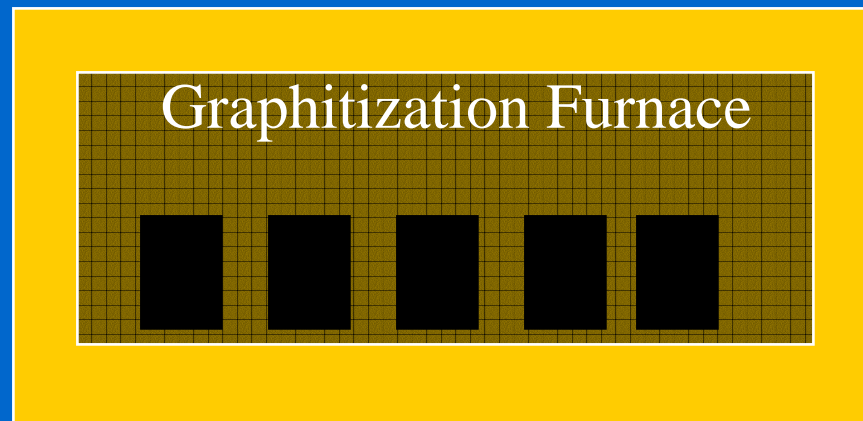
- Diamond crystal structure



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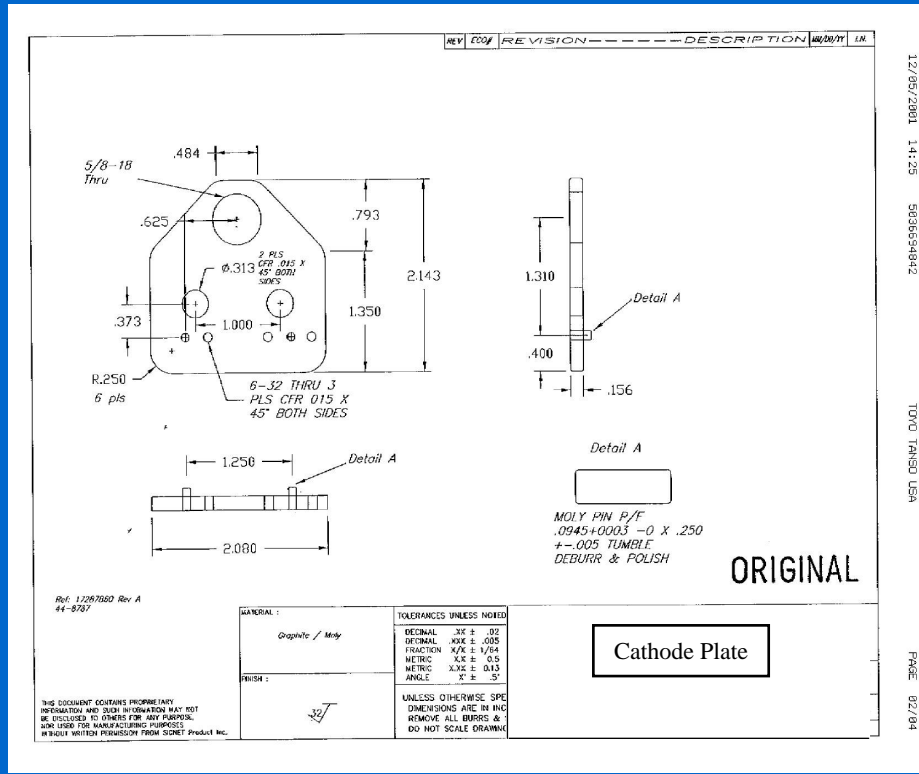
Ion Implant

- Amorphous carbon blocks are transformed into graphite material



Ion Implant

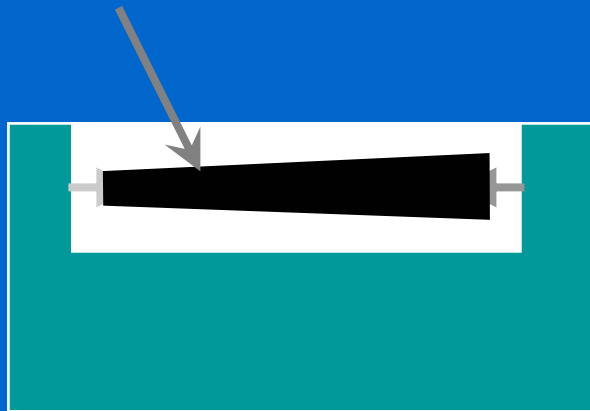
- Machining of graphite parts



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Ion Implant

- Graphite parts are machined



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Ion Implant

- Graphite Liner



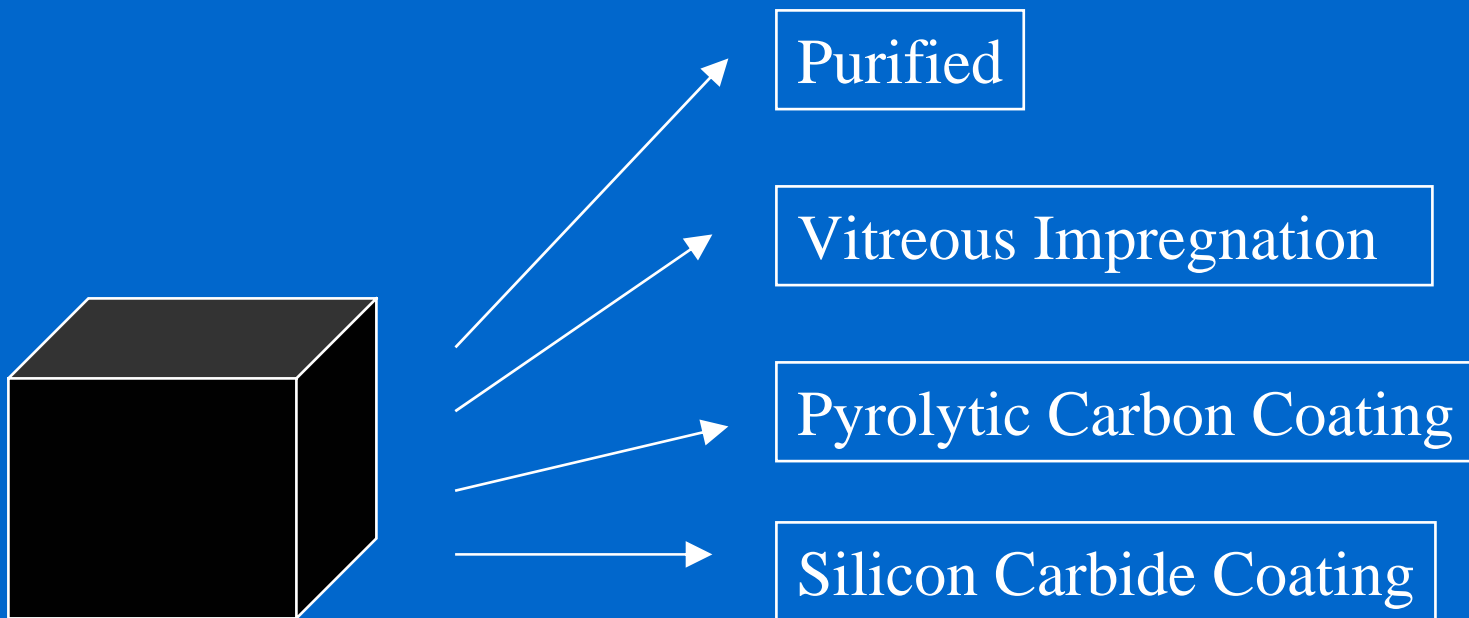
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Ion Implant

Video

Ion Implant

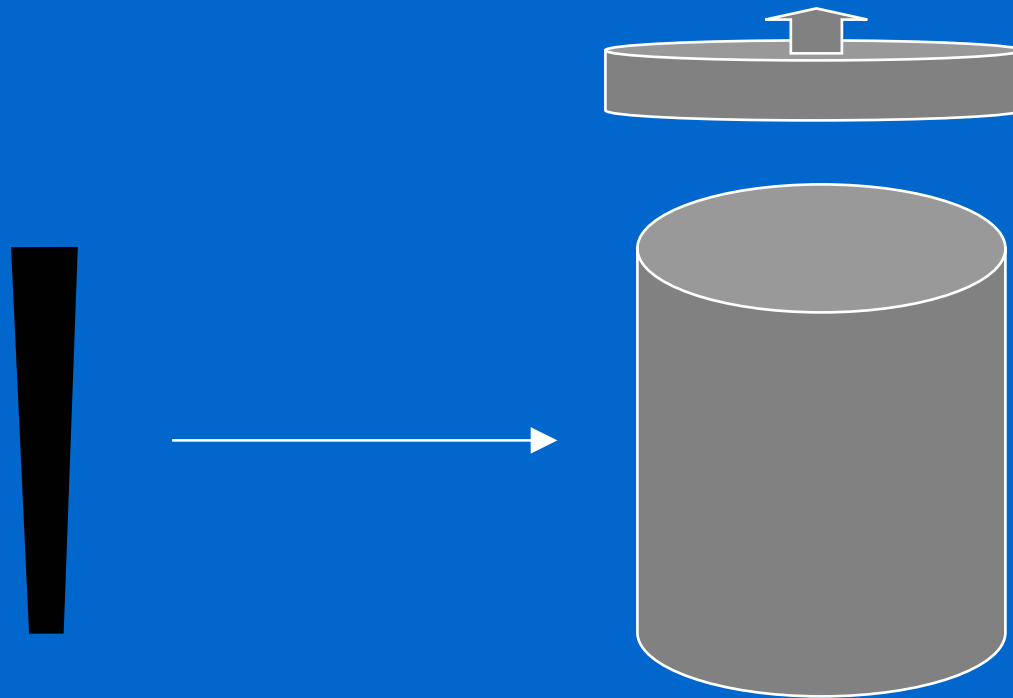
- Machined parts can be purified, coated or impregnated



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Ion Implant

- Machined parts are placed into a purification vessel



Ion Implant

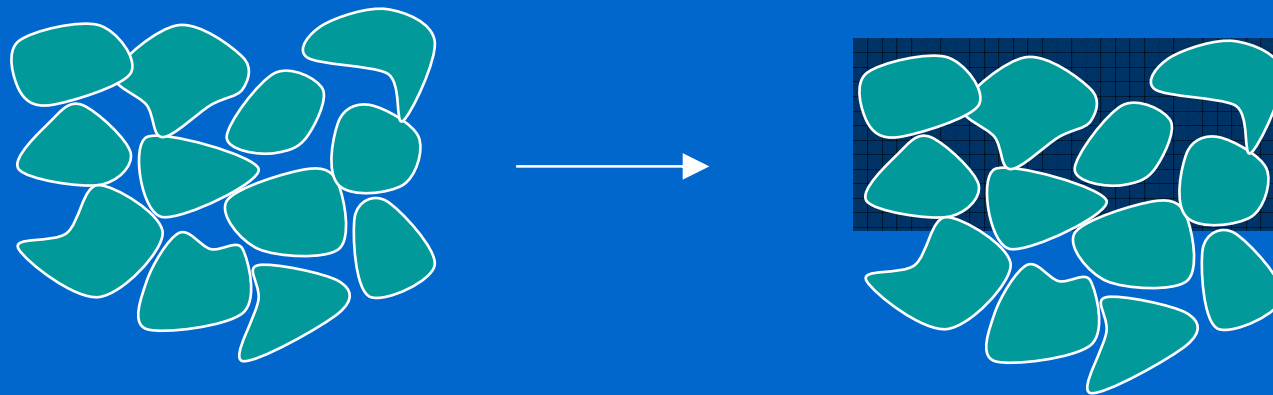
- Purified parts

- Boron - 0.20
- Magnesium - <0.02
- Potassium - <0.10
- Titanium - <0.09
- Chromium - <0.07
- Iron - <0.04
- Copper - <0.08
- Sodium - <0.05
- Aluminum - <0.08
- Calcium - <0.04
- Vanadium - <0.07
- Manganese - <0.03
- Nickel - <0.10
- Total Ash = < 5 ppm**

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Ion Implant

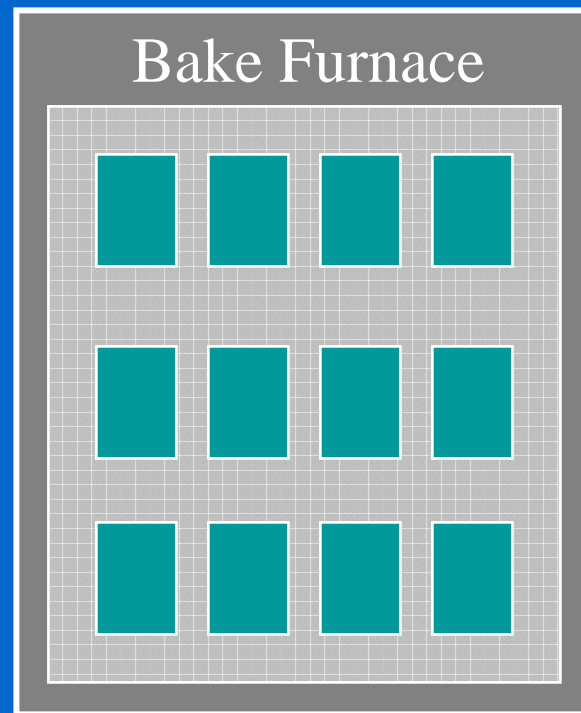
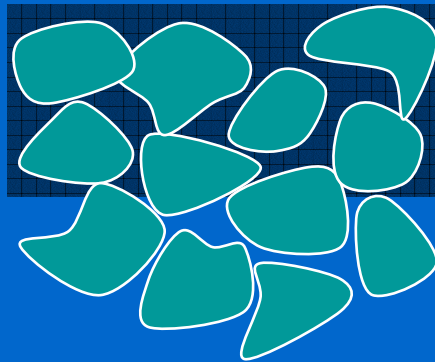
- Vitreous impregnation



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Ion Implant

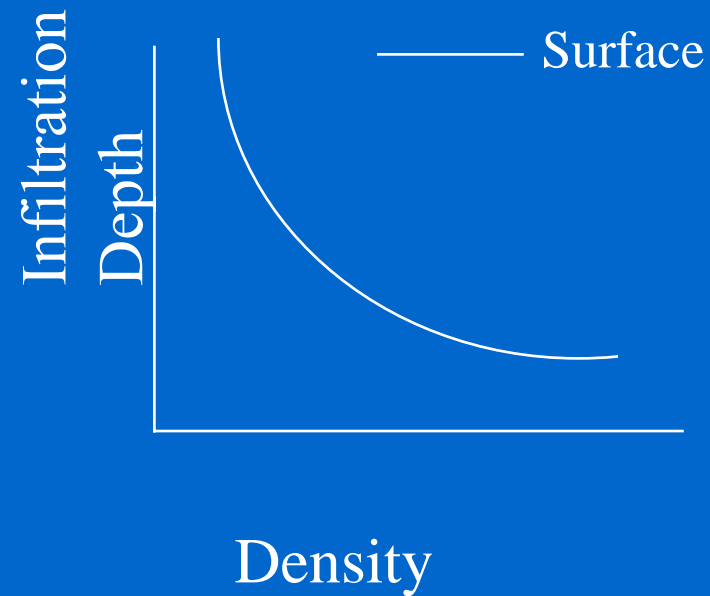
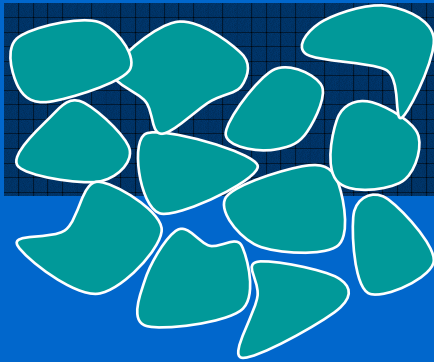
- Vitreous impregnation is baked



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Ion Implant

- Vitreous impregnation



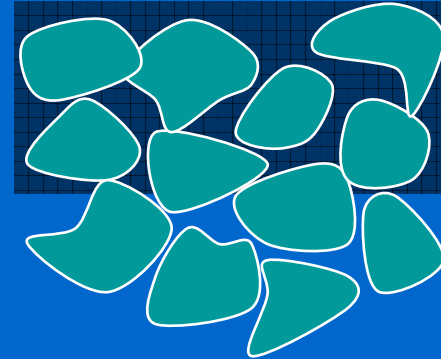
Ion Implant

- Vitreous impregnation
 - Boron - <0.01
 - Iron - <0.06
 - Aluminum - <0.6
 - Silicon - <0.7
 - Calcium - <0.08
 - Titanium - <0.01
 - **Total Ash = < 5 ppm**

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Ion Implant

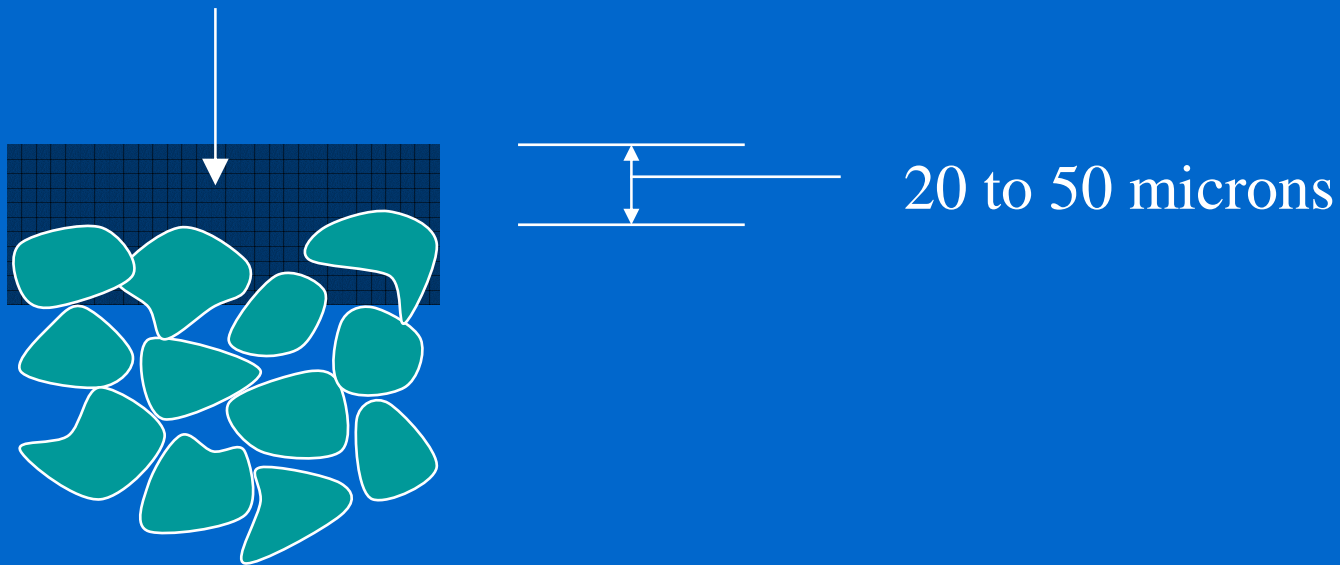
- Vitreous impregnation
 - Eliminate carbon dust
 - High purity (less than 5 ppm)
 - Fills micro-pores of graphite



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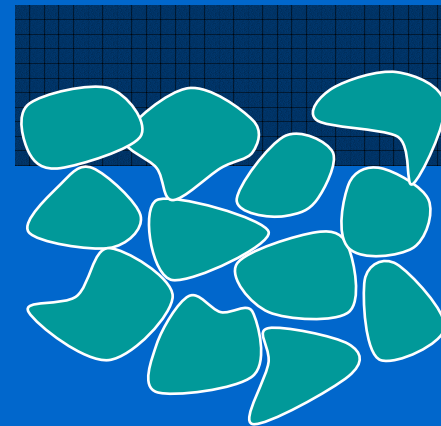
Ion Implant

- Pyrolytic Carbon Coating - CVD coating



Ion Implant

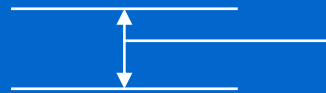
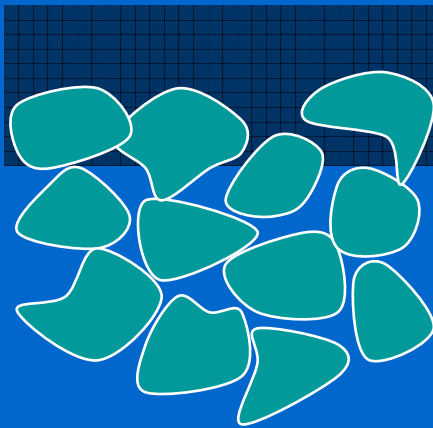
- Pyrolytic Carbon Coating - CVD coating
 - Very High Purity
 - Chemical Resistance
 - Very Low Gas Permeability
 - No Particle Emission



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Ion Implant

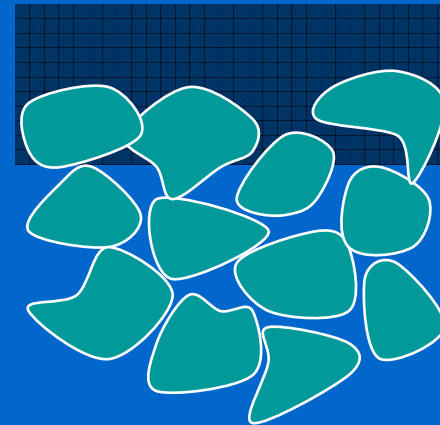
- Silicon Carbide Coating
 - CVD coating



4 to 5 Mills

Ion Implant

- Silicon Carbide Coating - CVD coating
 - High Purity - $< 2\text{ppm}$
 - Chemical Resistance
 - Very Low Gas Permeability
 - No Particle Emission
 - Very hard coating
 - Operate at high temperatures



Ion Implant

- Silicon carbide coating parts

- Boron - 0.4

- Magnesium - <0.01

- Phosphorous <0.01

- Potassium - <0.05

- Titanium - <0.01

- Chromium - <0.1

- Iron - <0.01

- Copper - <0.05

- Sodium - <0.01

- Aluminum - <0.01

- Sulfur - 0.04

- Calcium - <0.1

- Vanadium - <0.005

- Manganese - <0.01

- Nickel - <0.01

- Total Ash = < 2 ppm**

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Ion Implant

- Graphite is an integral part of Ion Implanters



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Ion Implant

Toyo Tanso USA Inc.

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