

L'art du polissage

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Introduction

Les étapes du polissage

- Le rodage ou meulage**
- Le pré-polissage**
- Le polissage grossier**
- Le polissage fin**
- La finition**
- Le nettoyage**

Le matériel de polissage

- Le polissage manuel**
- Le polissage automatique**

Le polissage et le MEB

Le polissage remonte au Néolithique (âge de la pierre polie)

9000 à 3300 avant J. C.

à partir de silex taillé

connu dès le Paléolithique supérieur : os, bois, ivoire

outils, esthétique, ...

**Vrai développement avec l'astronomie et les premiers
télescopes**

**Bon polissage : absence de défauts de surface (rayures, taches)
en conservant l'intégrité des inclusions et des phases**

Le rodage ou meulage

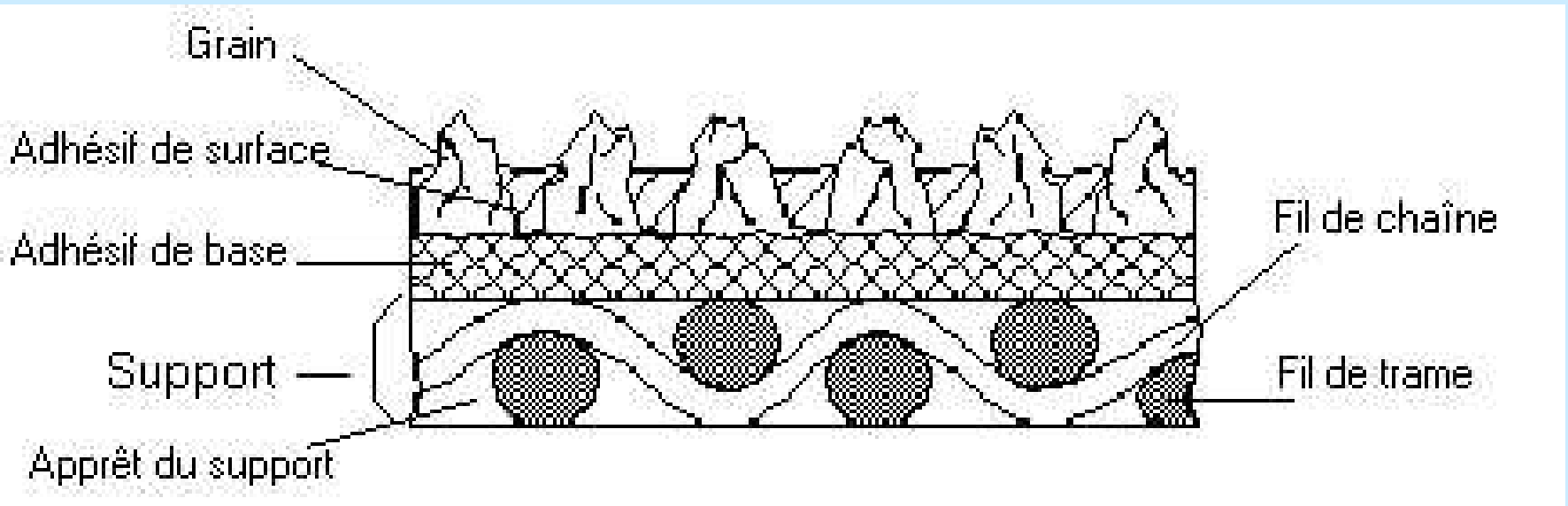
Dégrossissage assuré par des grains millimétriques $P < 20$

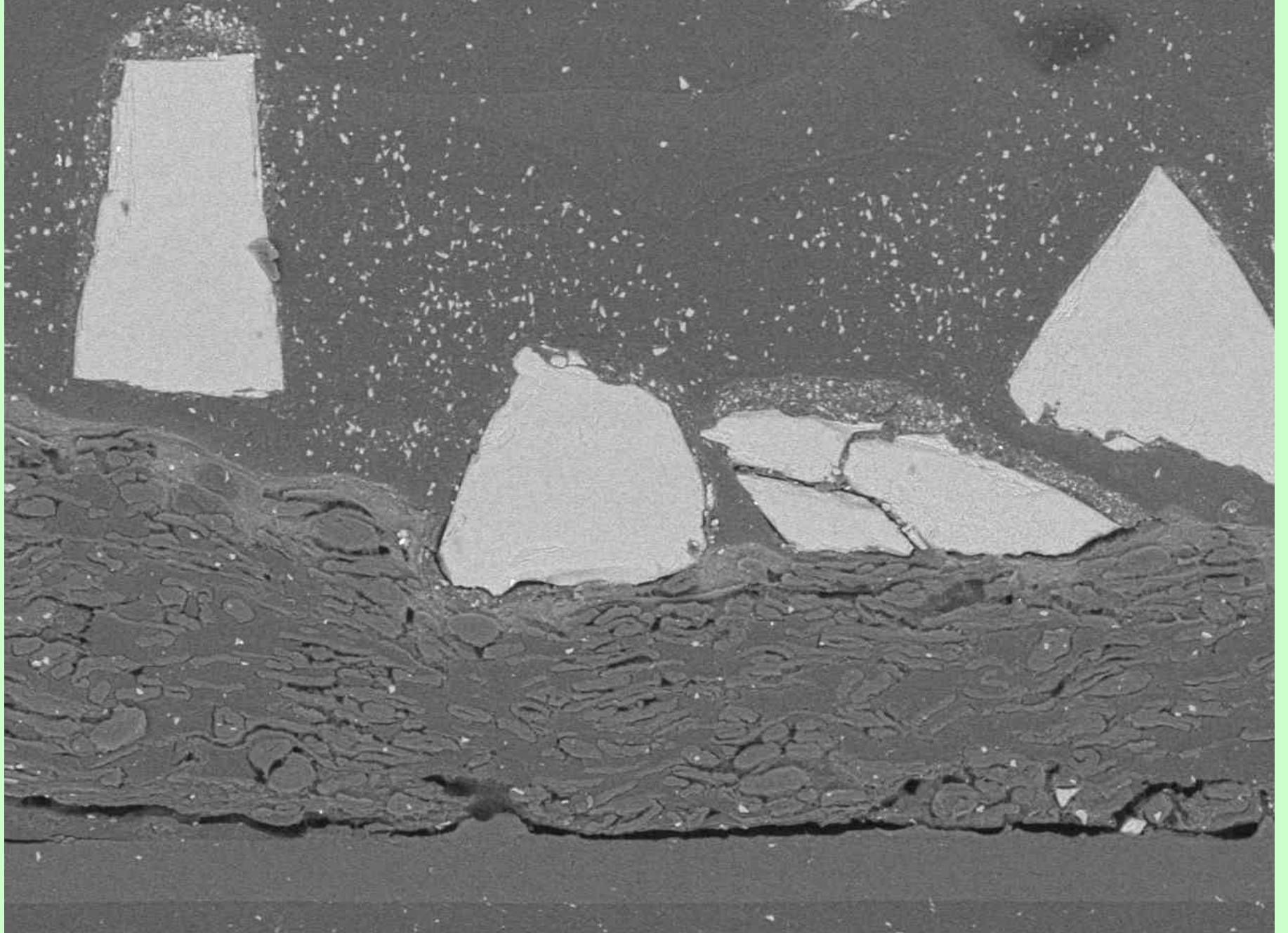
Le pré-polissage

Utilise des macrograins $> 60 \mu\text{m}$ grades $P < 230$

Abrasifs appliqués sur papier 60 à 500 g/m^2

Force : 20 N



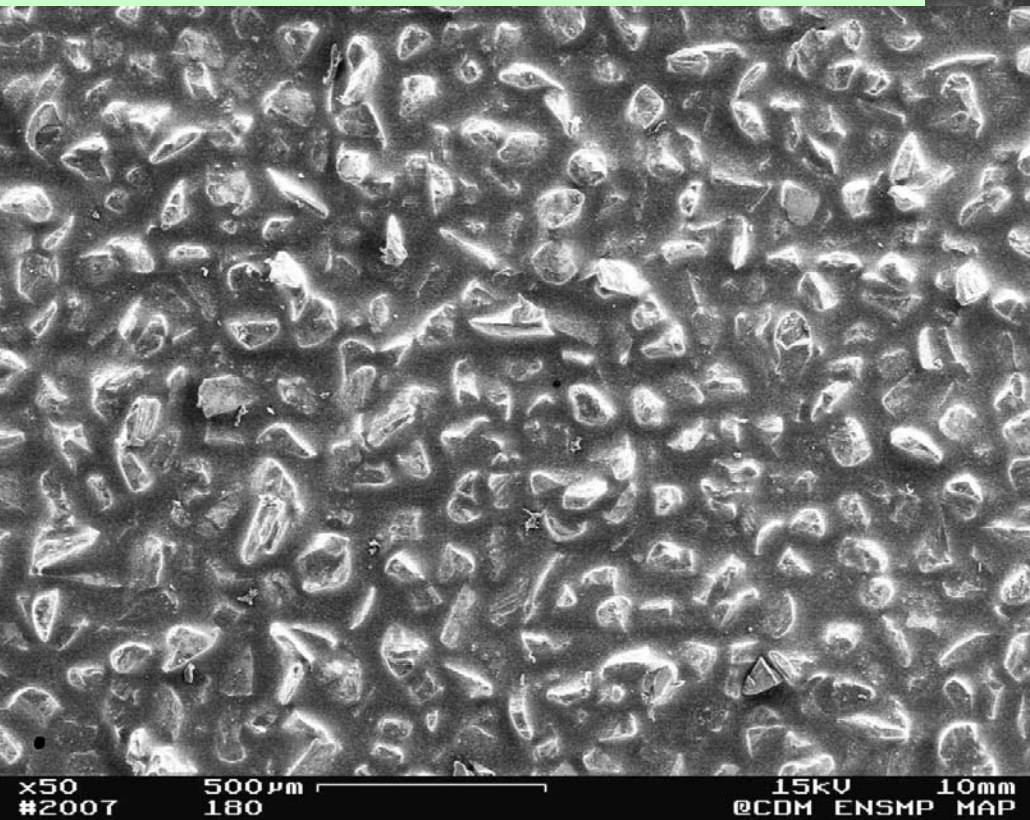
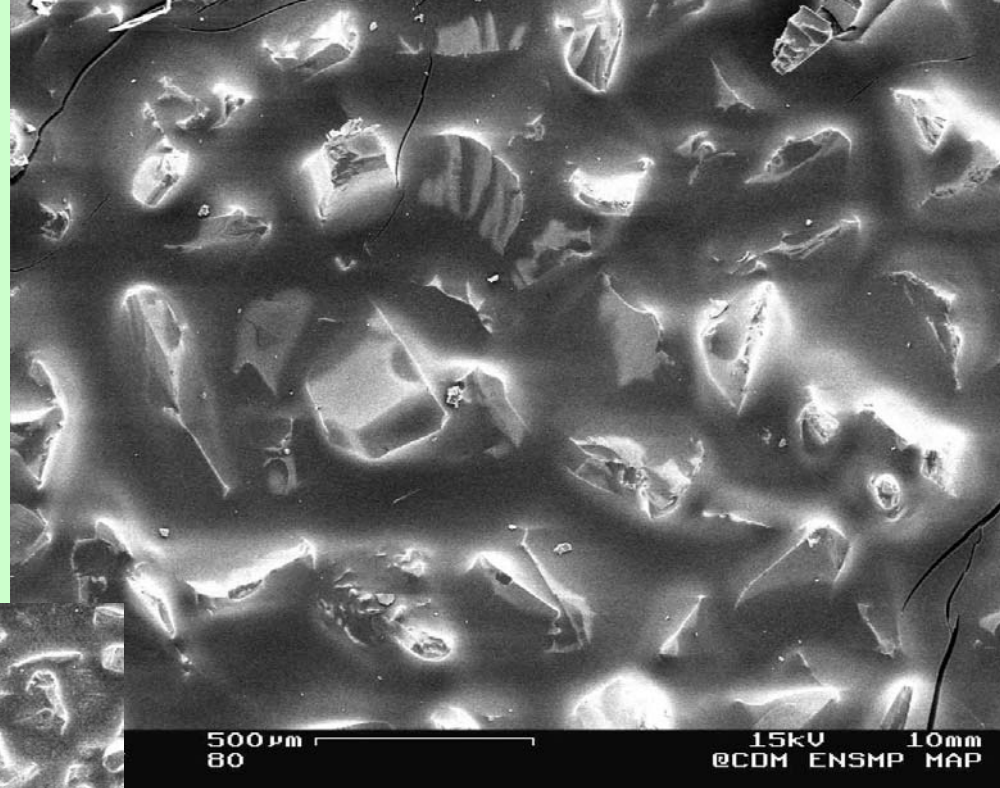


x150
#2007

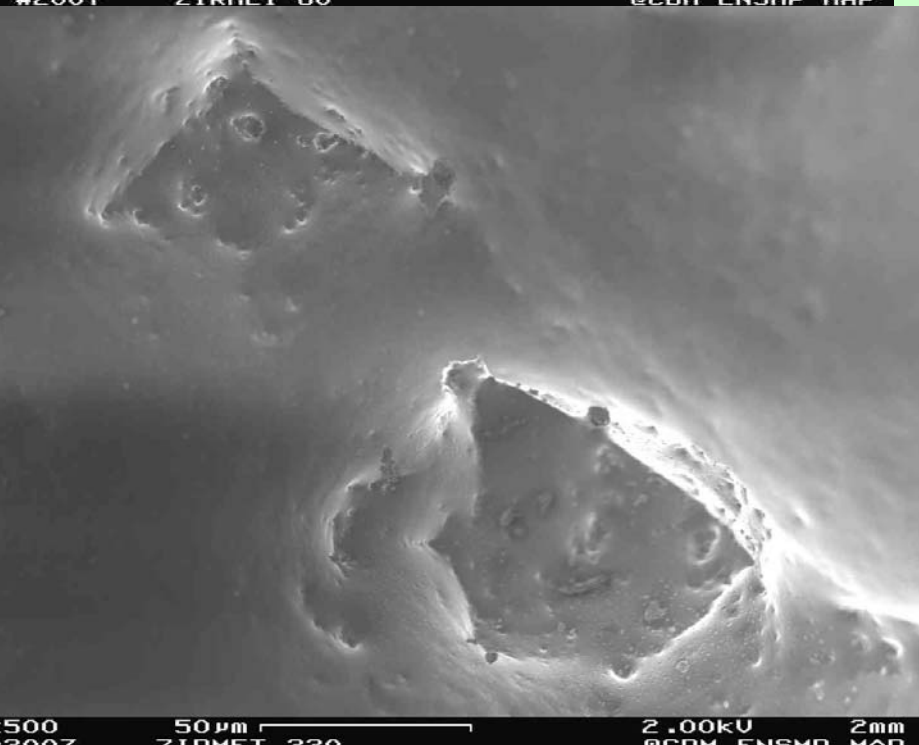
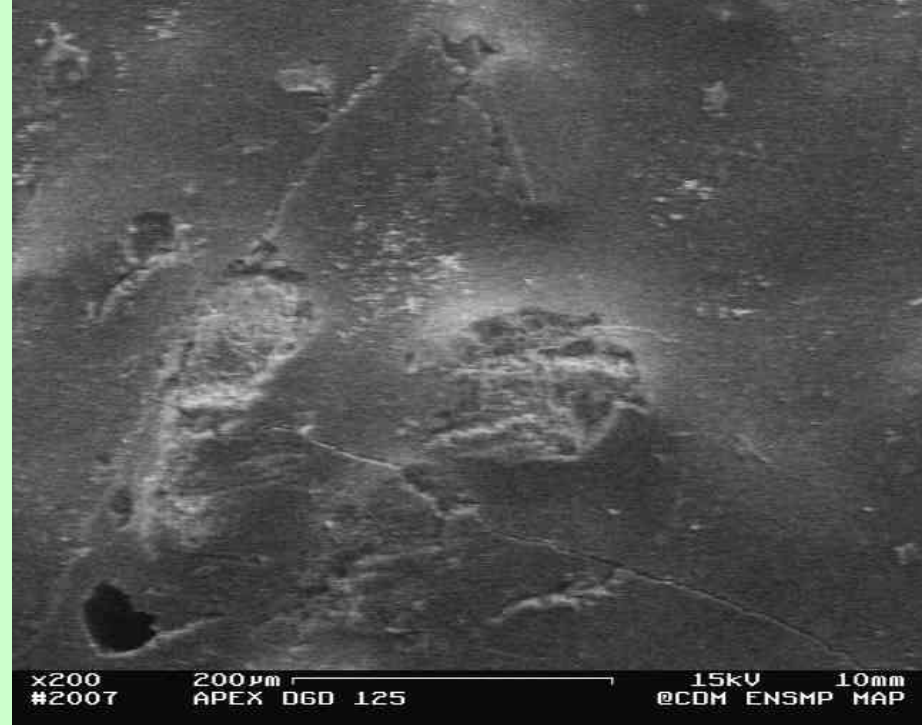
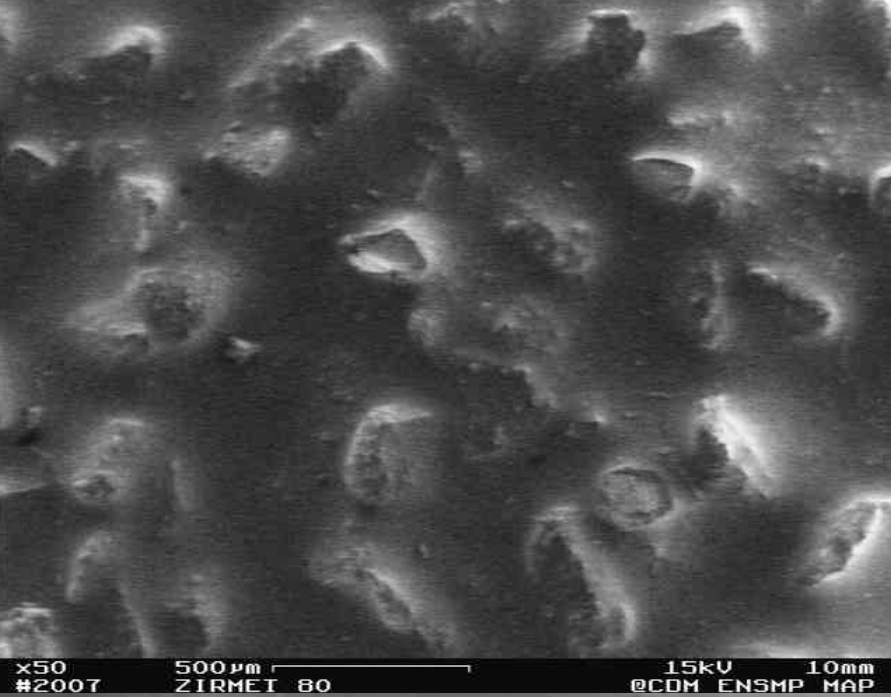
200 μm
P80

15kV 10mm
@CDM ENSMP MAP

Papier P80



Papier P180



**Abrasifs enrobés pour
polissage rapide et
polissage automatique**

Polissage grossier

Utilise des micrograins 60 à 5 μm

Abrasifs appliqués code P selon les normes ISO 6344-1 et FEPA 43-93

ISO 6344-2 : tamisage \rightarrow P220 / ISO 6344-3 : lévigation

2 catégories : P300 à P800 et P1000 à P4000

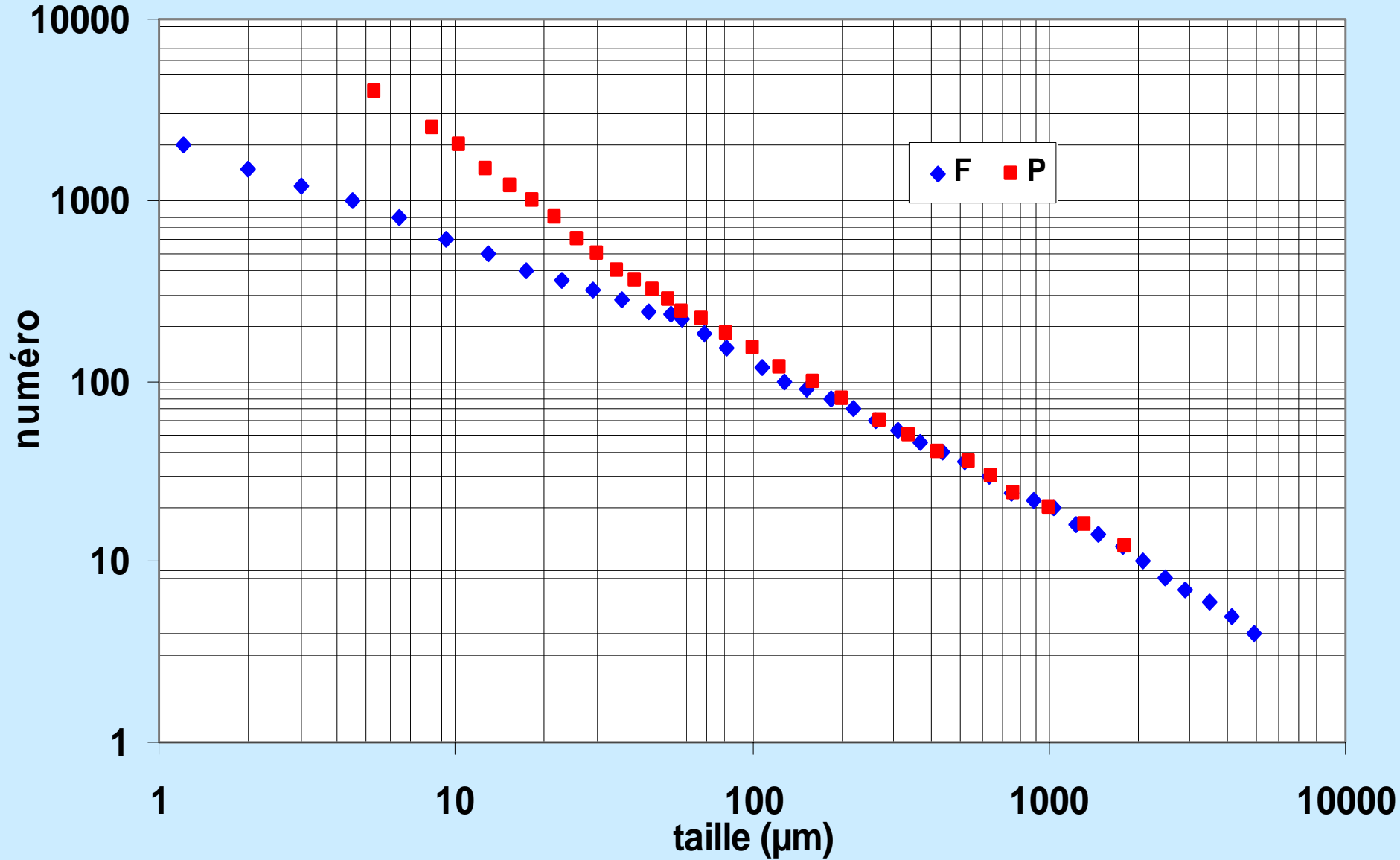
Risque d'écrouissage pour les grades les plus élevés

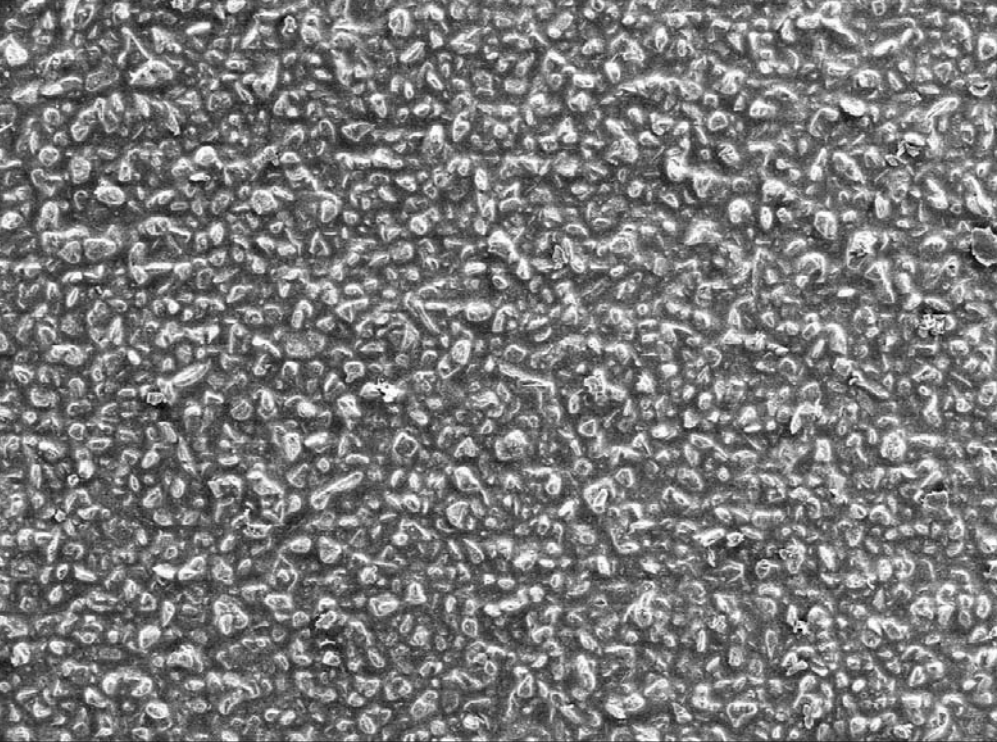
Disparition des rayures des grades précédents

Arrosage important

Macrograins	Macrograins	Micrograins	Micrograins
N° grain	Diamètre moyen (µm)	N° grain	Diamètre moyen (µm)
P12	1815	P240	58,5
P16	1324	P280	52,2
P20	1000	P320	46,2
P24	764	P360	40,5
P30	642	P400	35,0
P36	538	P500	30,2
P40	425	P600	25,8
P50	336	P800	21,8
P60	269	P1000	18,3
P80	201	P1200	15,3
P100	162	P1500	12,6
P120	125	P2000	10,3
P150	100	P2500	8,4
P180	82	P4000	5,3
P220	68		

granulométrie abrasifs

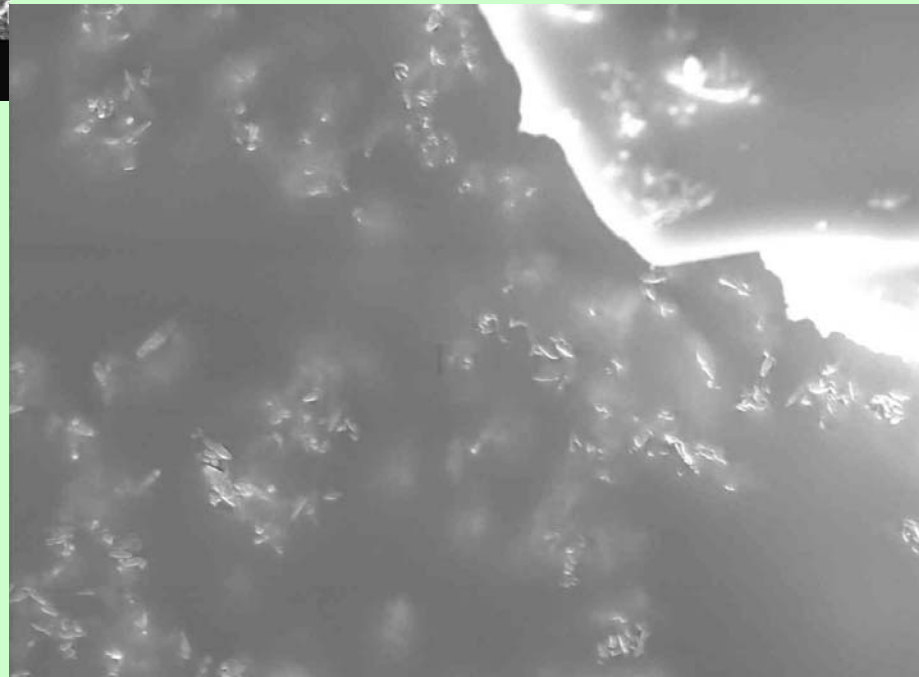




x50 500 μ m 15kV 10mm
#2007 400 @CDM ENSMP MAP

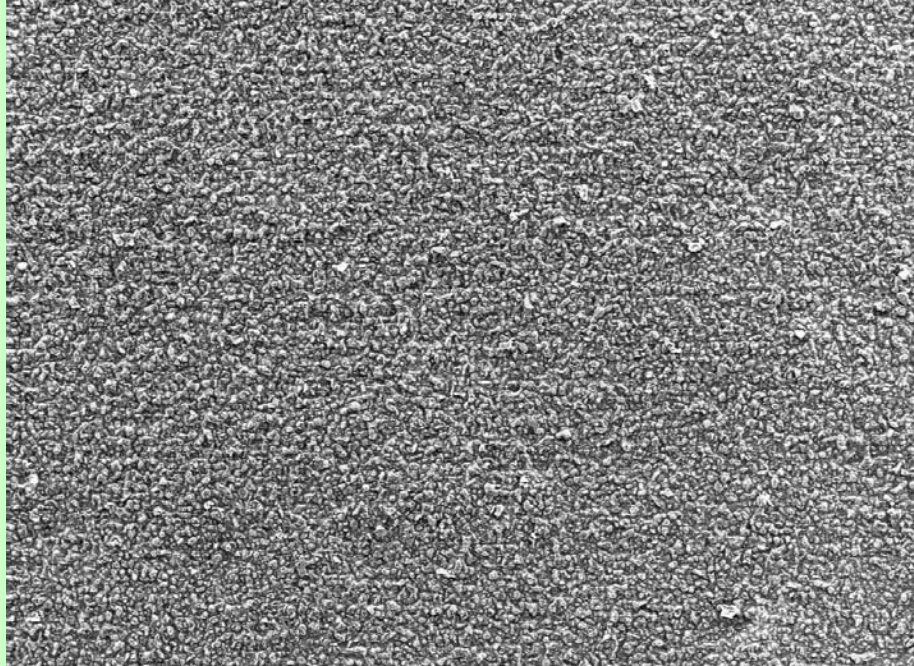
P400

Charge active



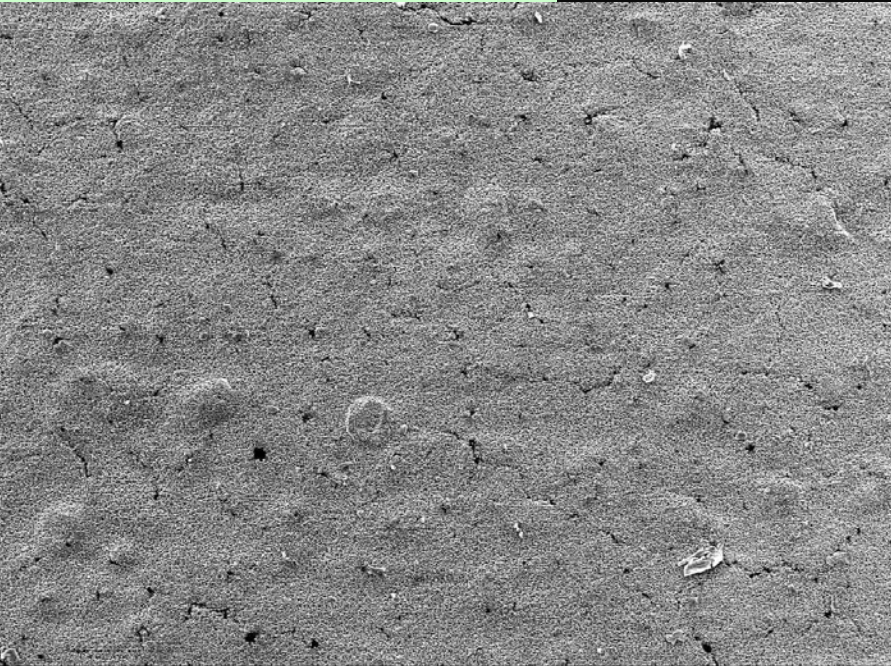
x5000 5 μ m 15kV 10mm
#2007 400 @CDM ENSMP MAP

P1200



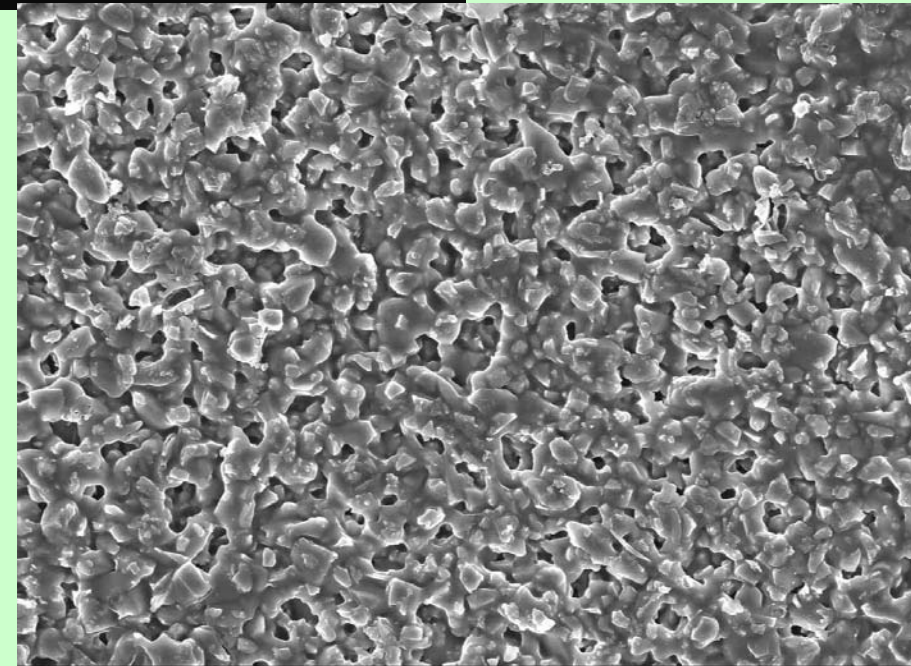
x50 #2007 500µm 1200 15kV 12mm @CDM ENSMP MAP

P4000



x50 #2007 500µm 4000 15kV 10mm @CDM ENSMP MAP

P4000



x1000 #2007 20µm 4000 15kV 10mm @CDM ENSMP MAP

Polissage fin

Technique différente : support et abrasifs séparés

Support : tissu tissé ou velours (fibres imprégnées ou floquées)

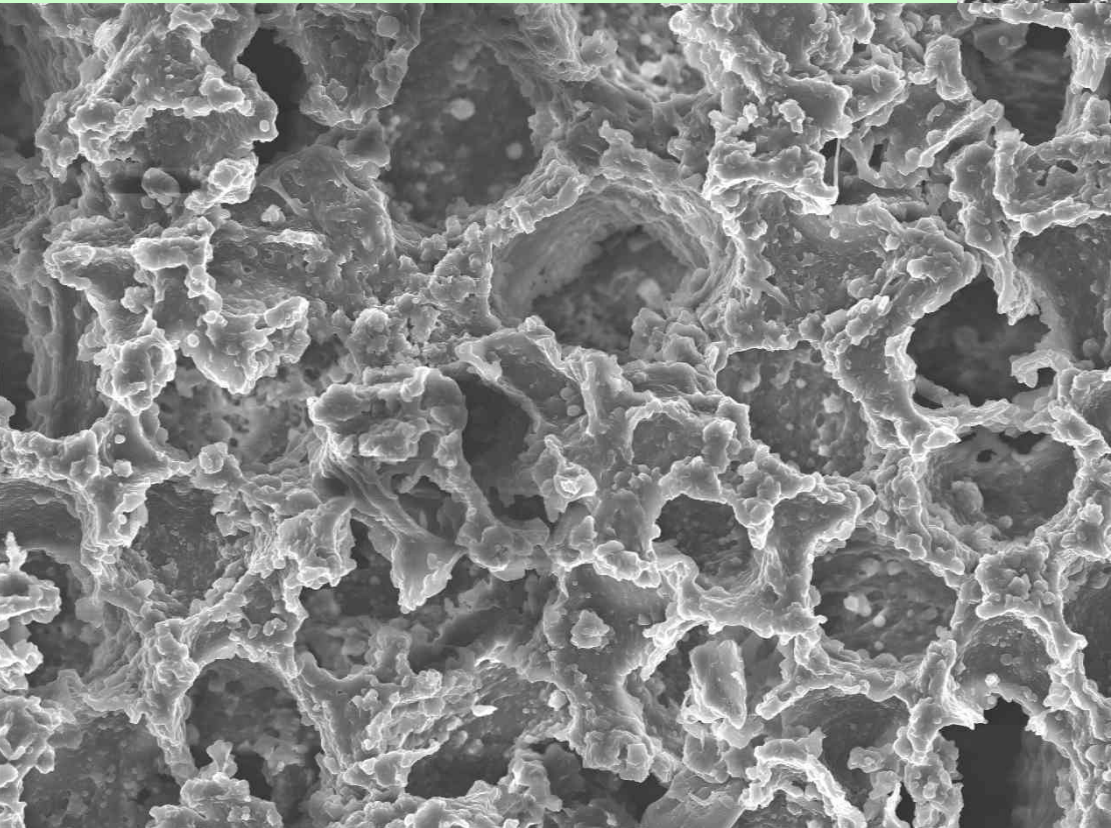
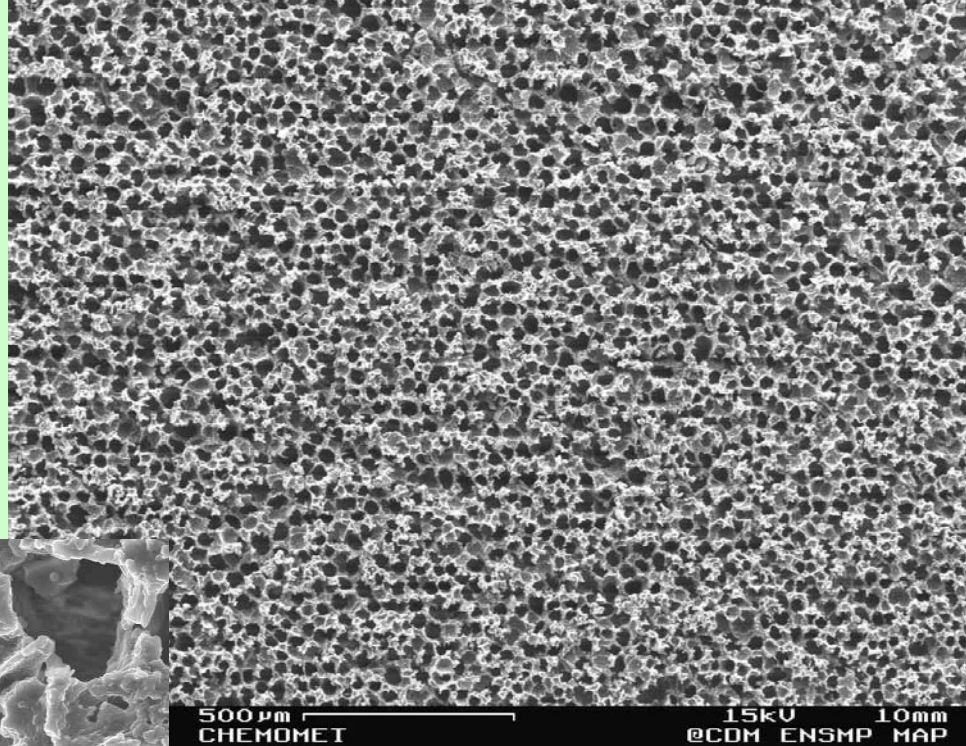
Abrasifs : diamant ou nitrure de bore cubique, Al_2O_3 , carbure de bore, de chrome, oxyde de cérium, de fer, de magnésium, chromique, de plomb, d'étain, de zirconium.

Sous différentes formes : poudre, pâte ou aérosol avec solvant aqueux, alcoolisé ou huileux

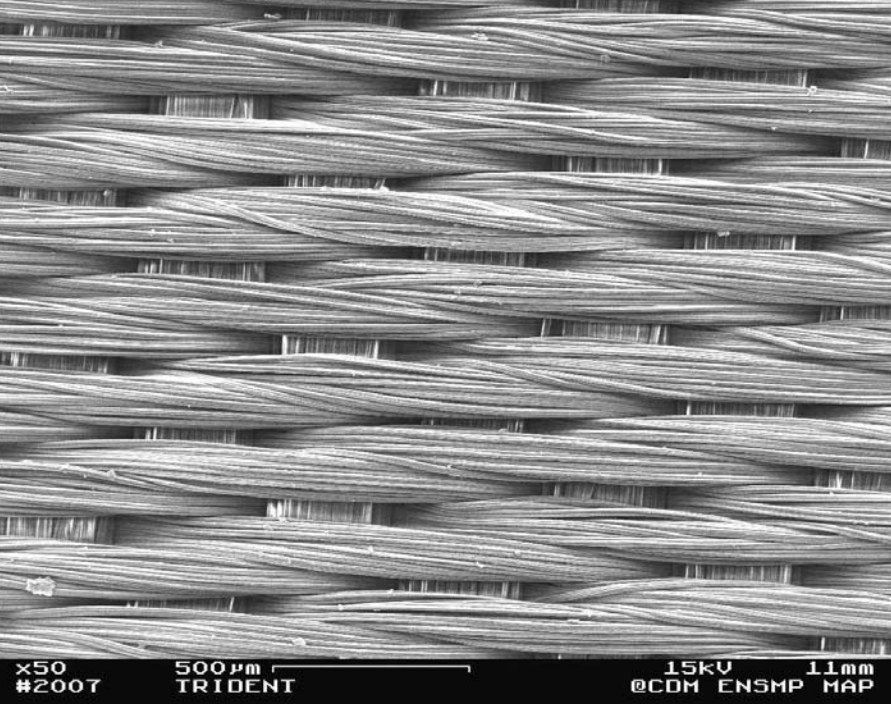
Force 10 N

Support alvéolaire

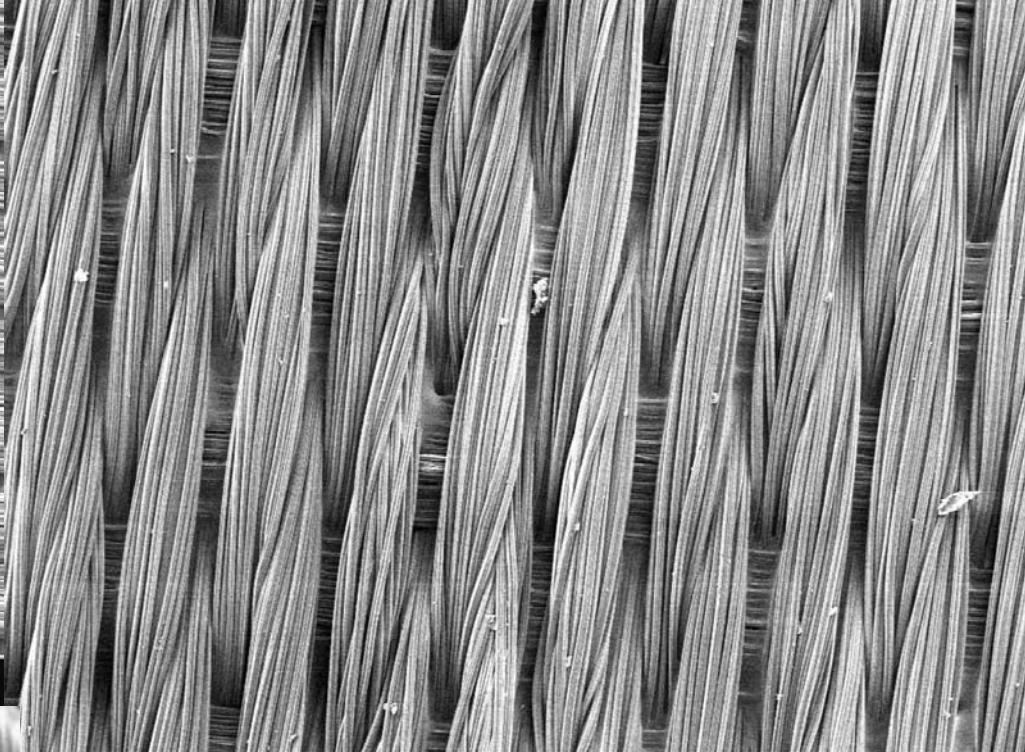
45 à 3 μm



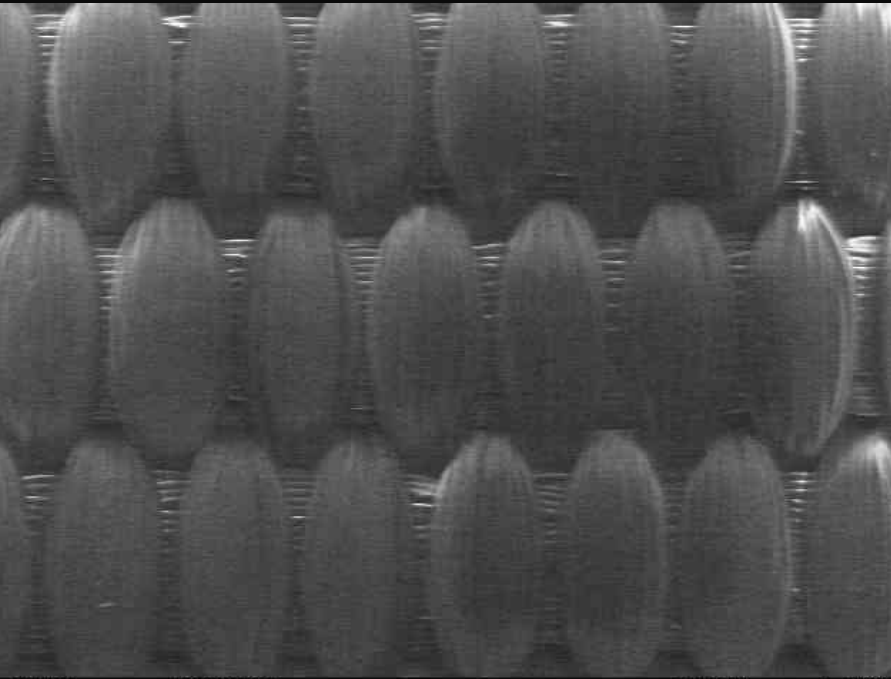
x500 #2007 50 μm CHEMOMET 15kV 10mm @CDM ENSMP MAP



x50 500 μ m 15kV 11mm
#200T TRIDENT @CDM ENSMP MAP



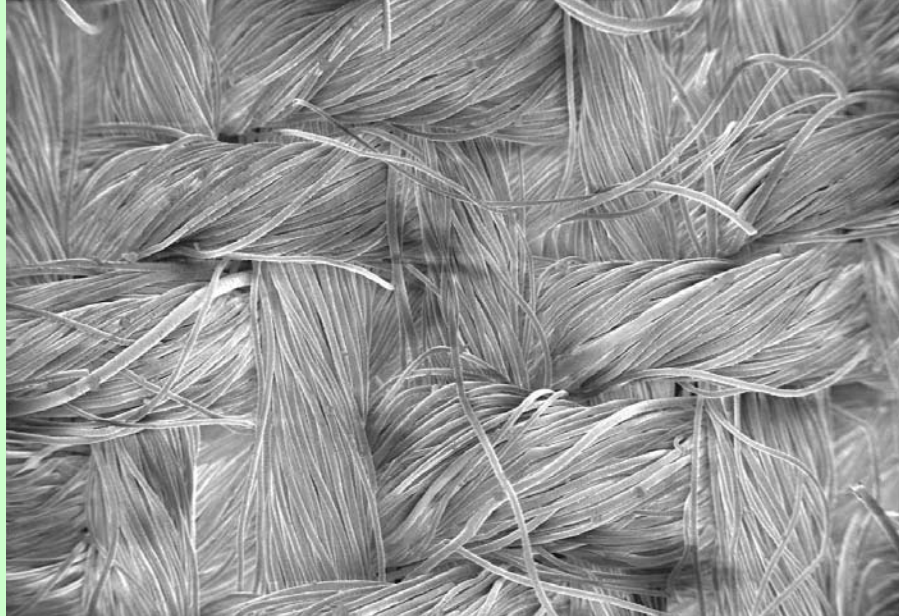
x50 500 μ m 15kV 11mm
#200T VERDUTEX @CDM ENSMP MAP



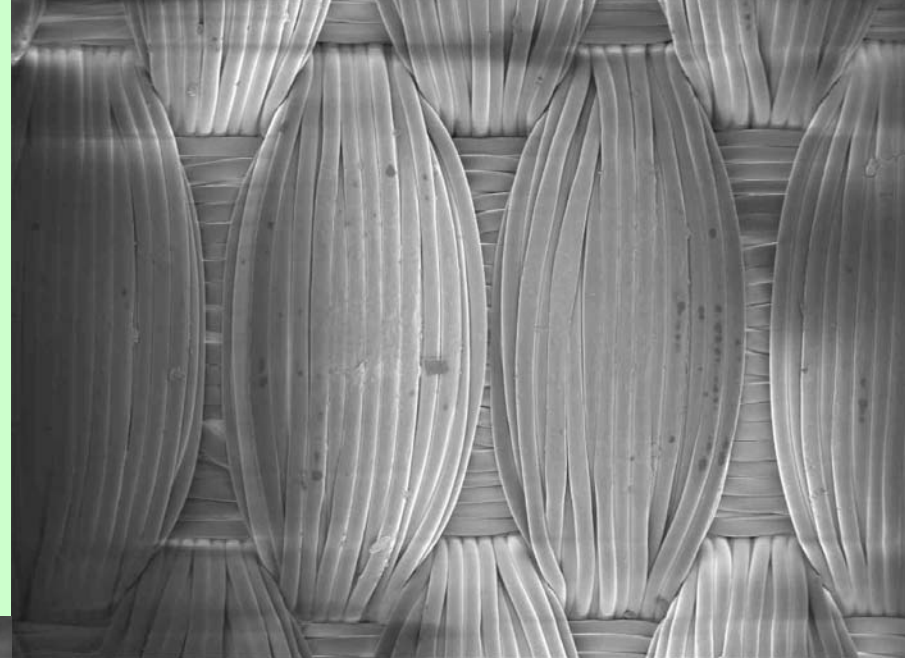
x50 500 μ m 15kV 11mm
#200T ULTRAPAD @CDM ENSMP MAP

Tissu tissé

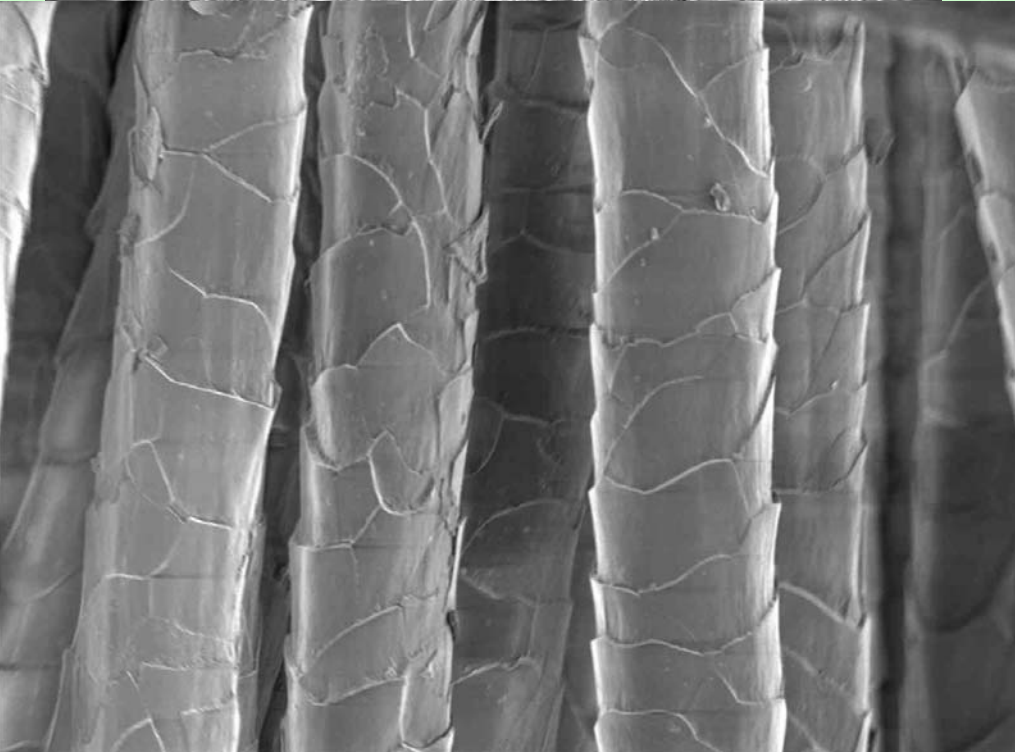
9 à 1 μ m



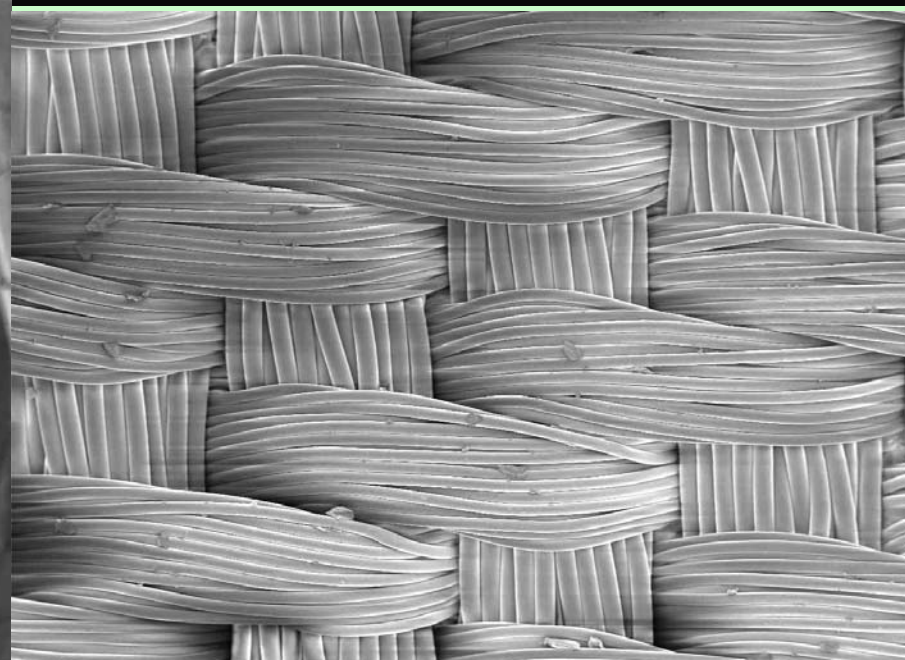
6x
1 μm



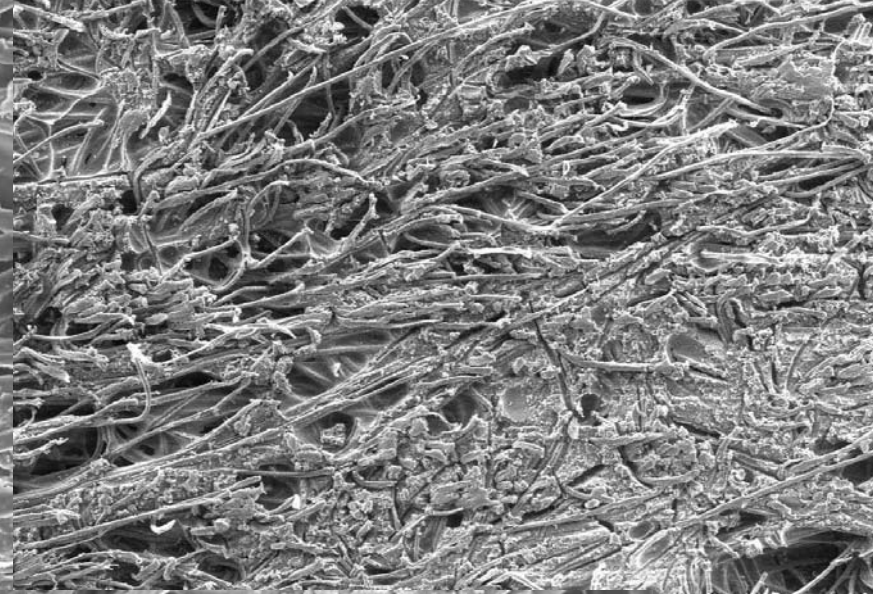
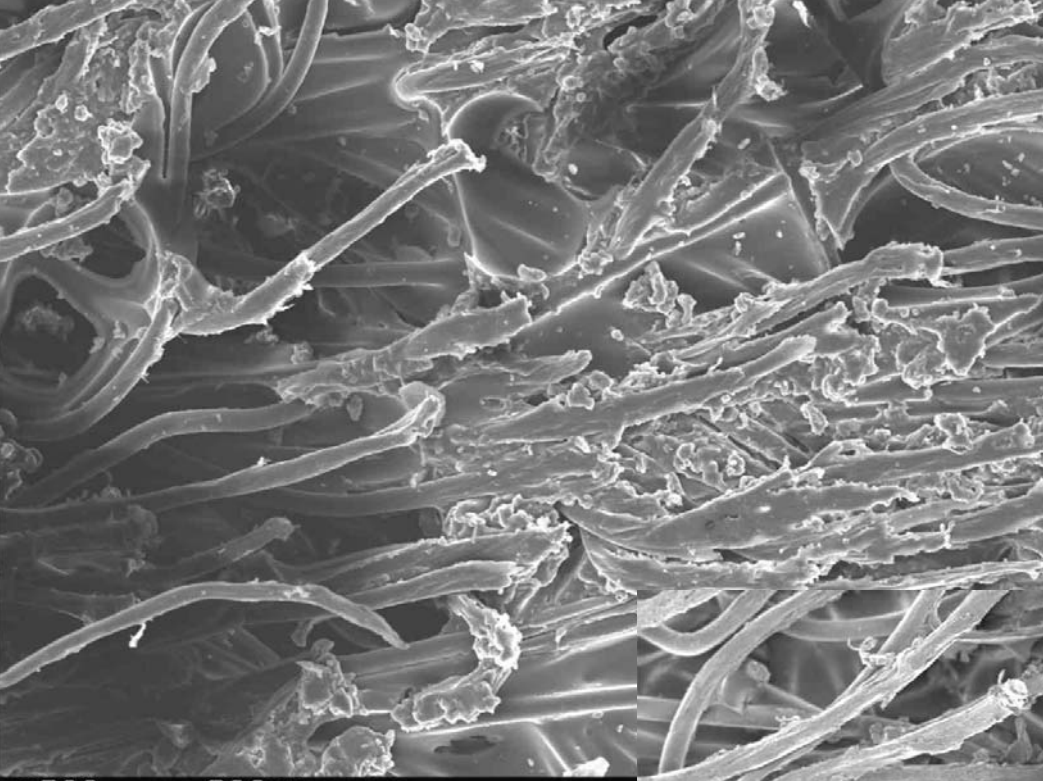
x100 #2007 200 μm ULTRAPAD 2.00kV @CDM ENSMP 5mm MAP



x1000 #2007 20 μm POLICLOTH 2.00kV @CDM ENSMP 4mm MAP



x100 #2007 200 μm NYLON 2.00kV @CDM ENSMP 3mm MAP

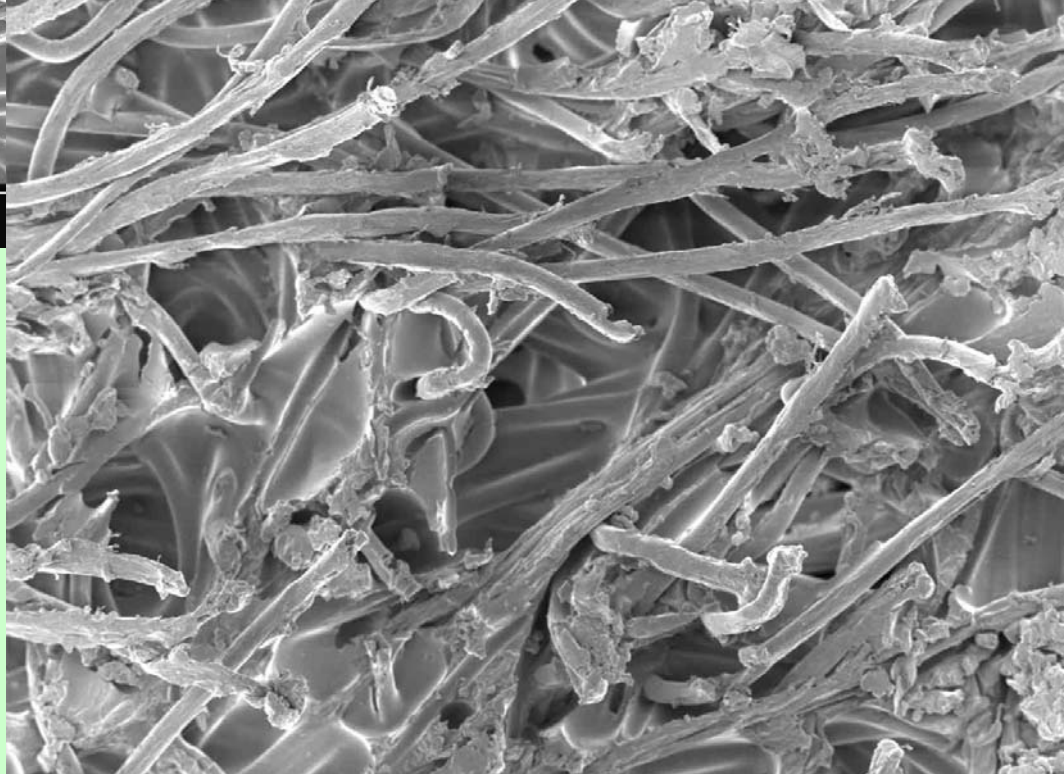


x200 #2007 200µm TEXMET 1500

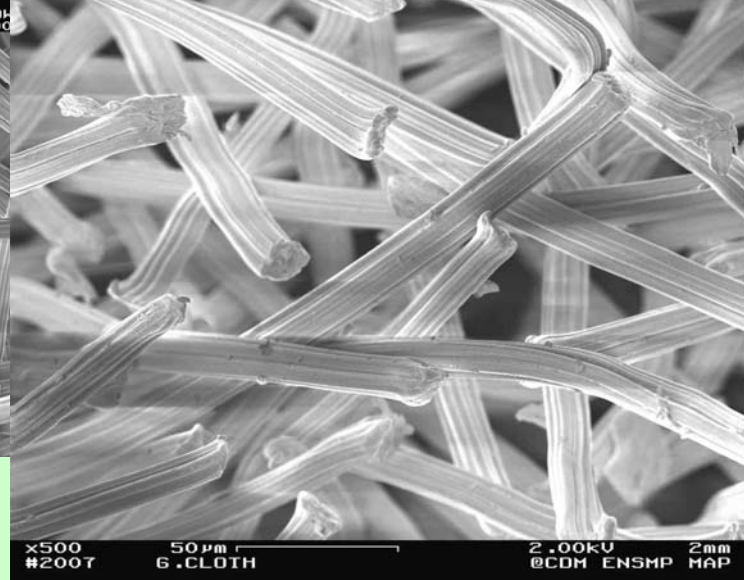
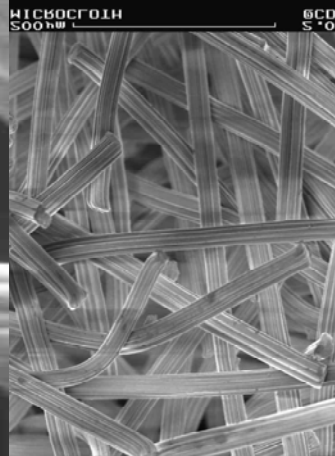
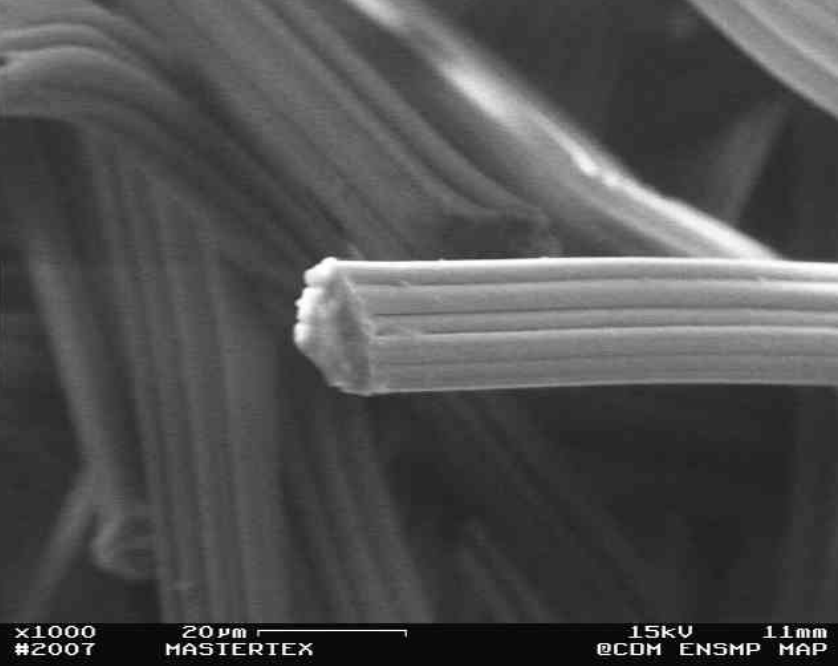
5kV 11mm M ENSMP MAP

Drap floqué

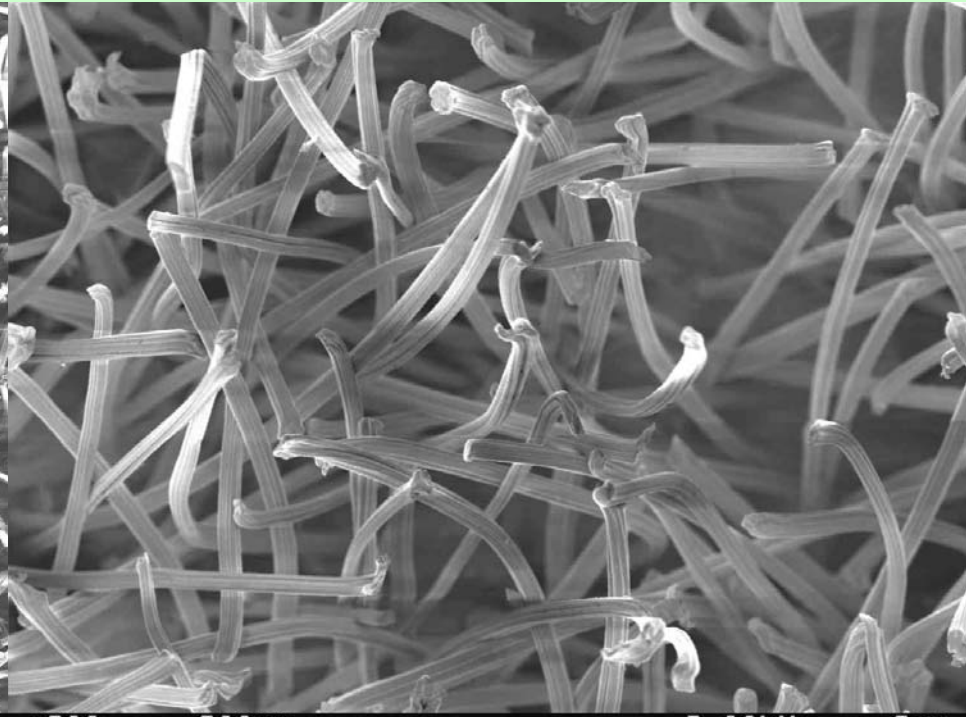
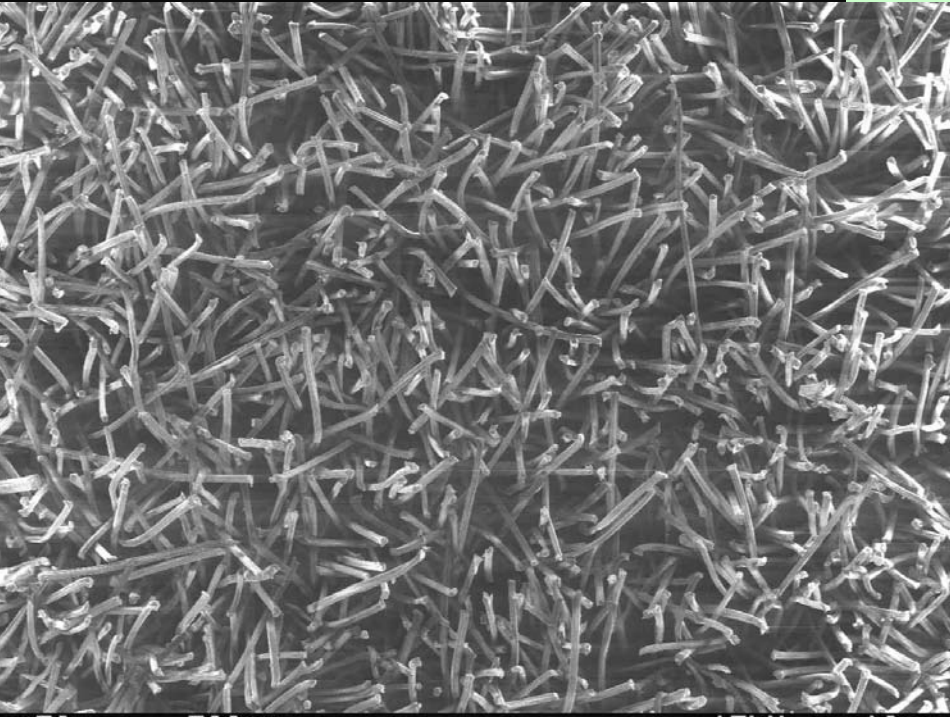
13 à 3 µm



x200 #2007 200µm TEXMET 2500 2.00kV @CDM ENSMP MAP 3mm



9 à 0,25 μm

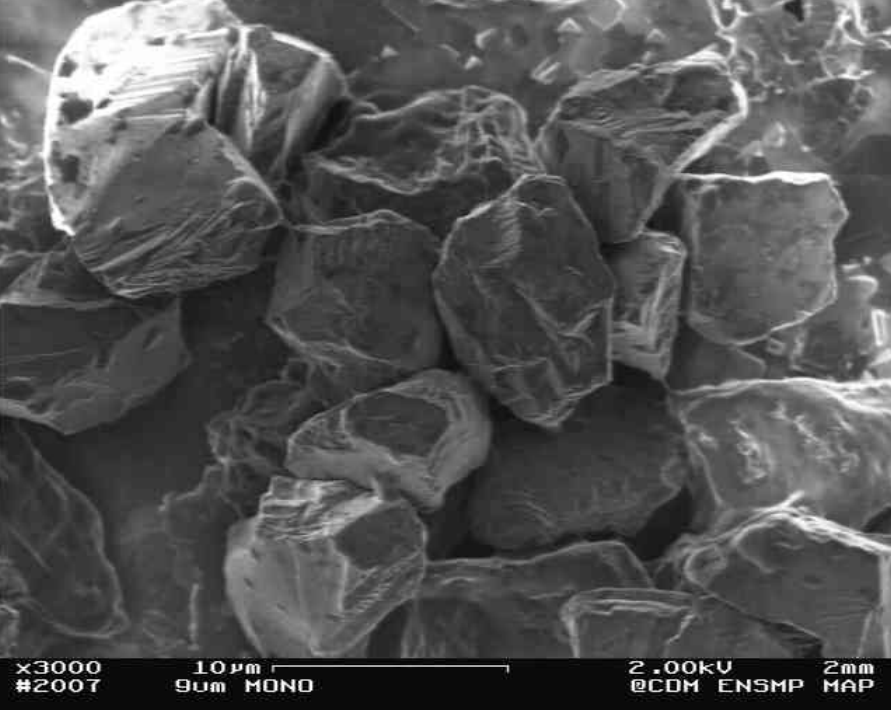


Abrasifs pour polissage fin

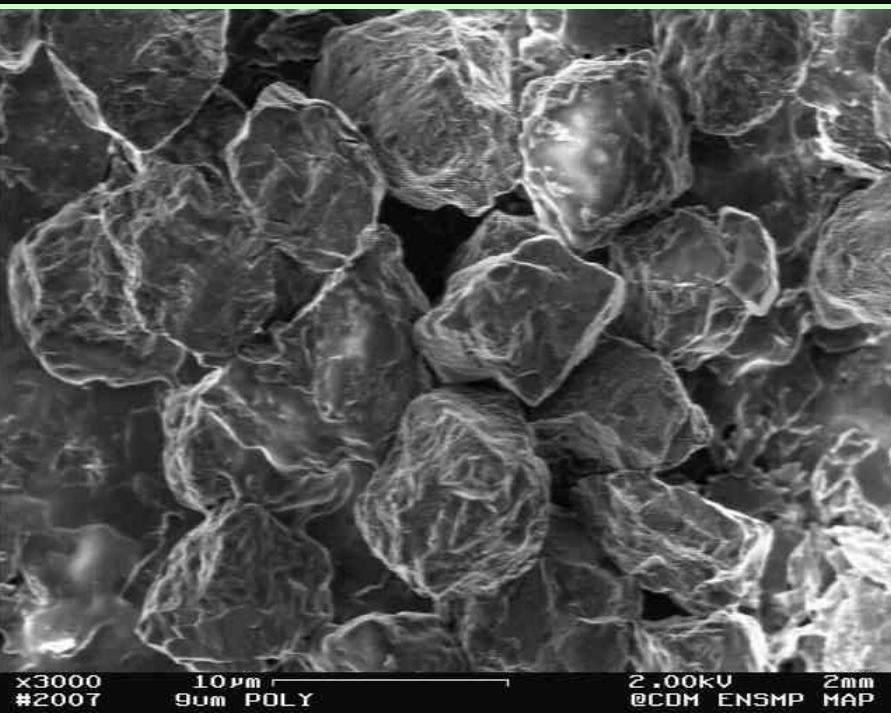
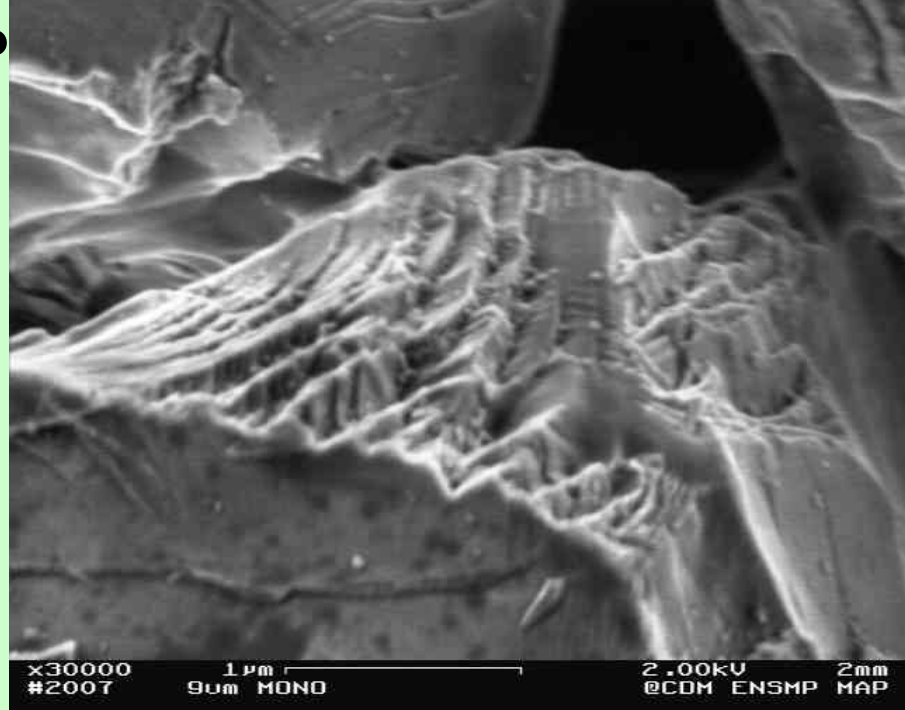
Diamant

- **monocristallin**
- **polycristallin**

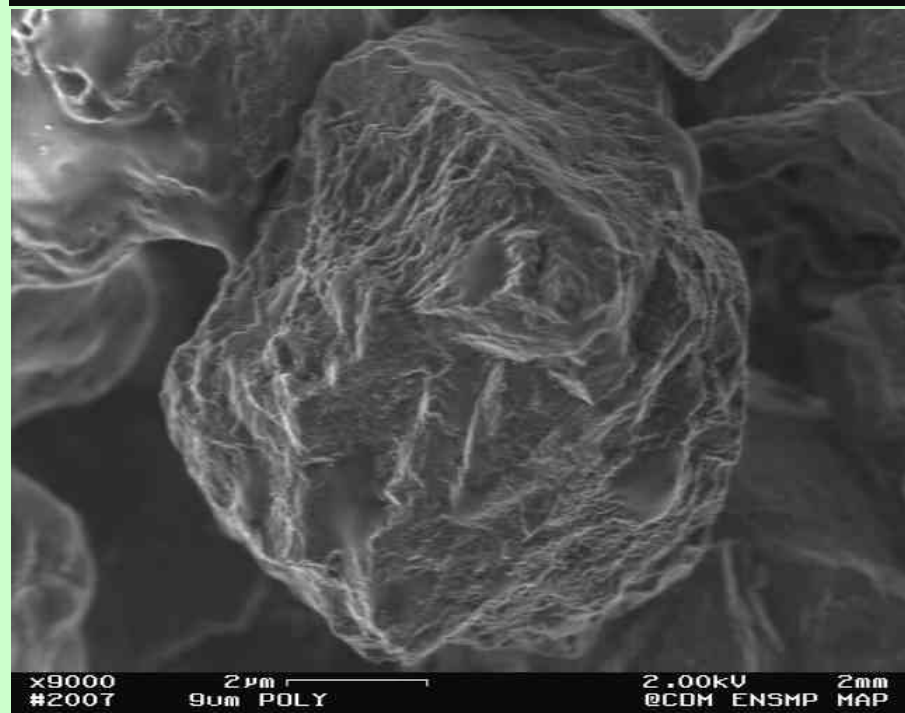
Suspension aqueuse (problème huile)

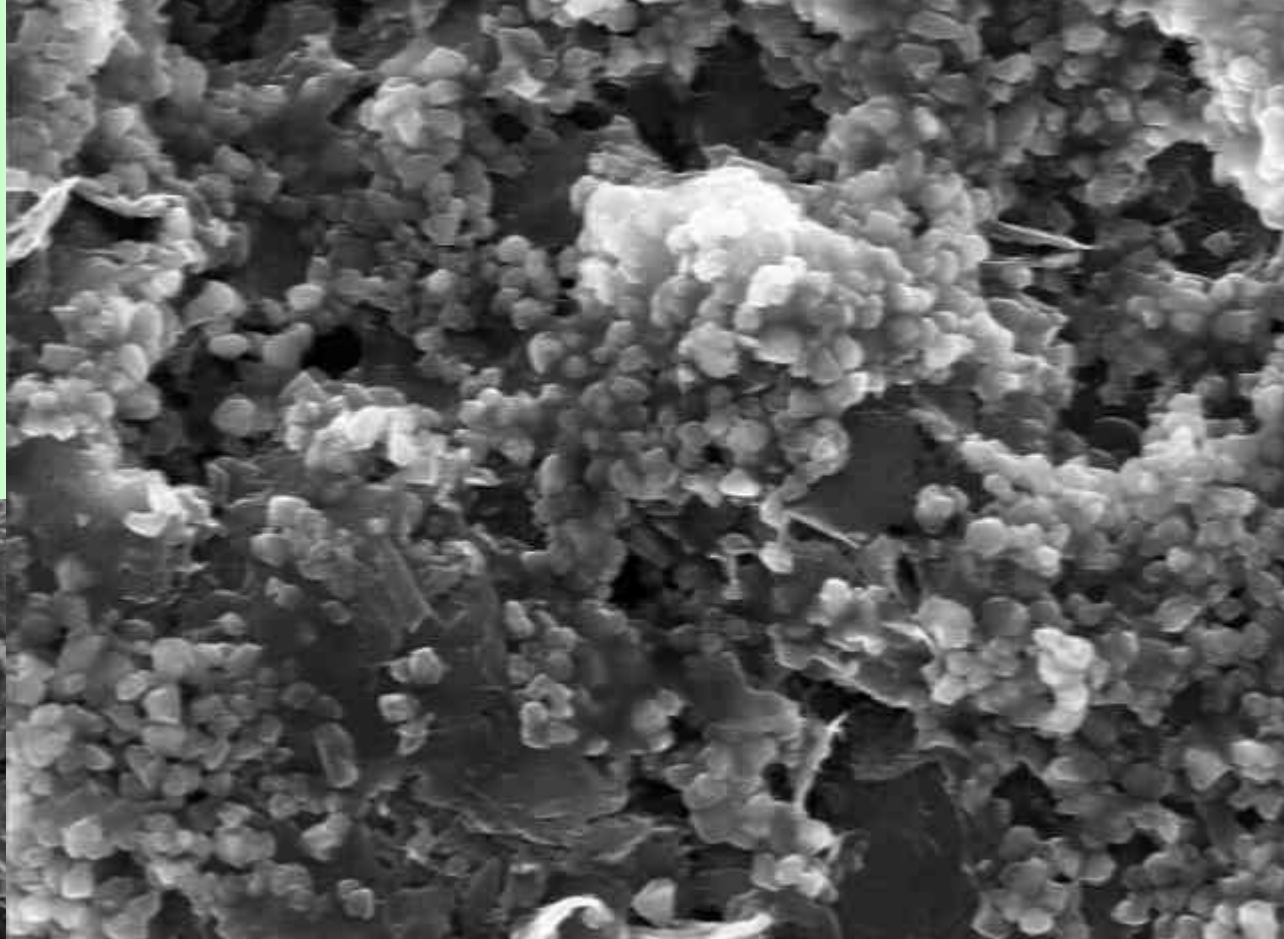


mono



poly

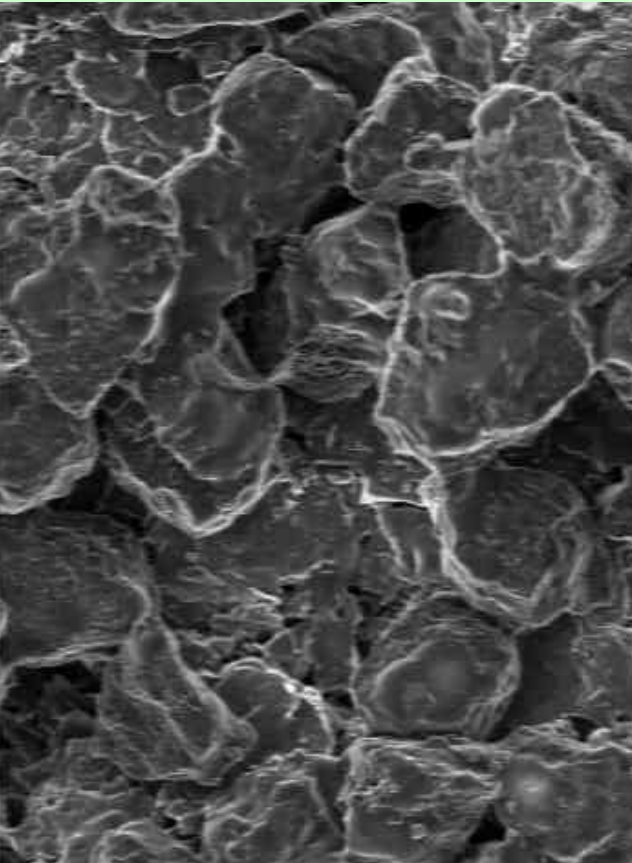




x5000
#2007

5 μ m
1 μ m POLY

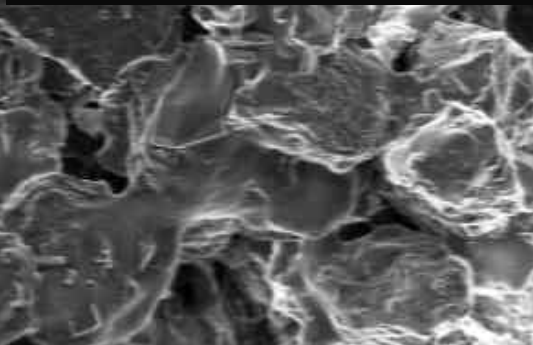
15kV 10mm
@CDM ENSMP MAP



x3000
#2007

10 μ m
6 μ m POLY

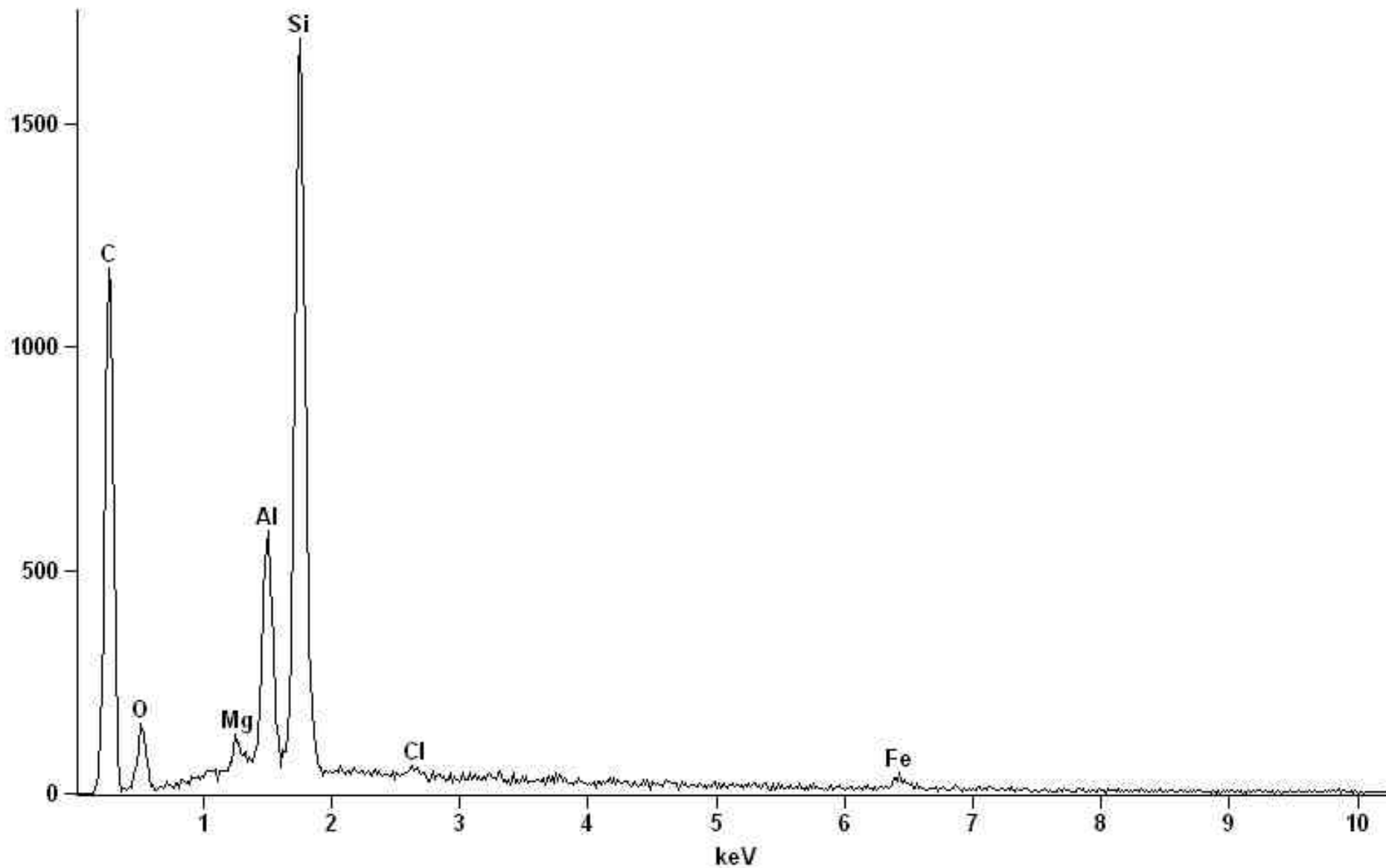
2.00kV 2mm
@CDM ENSMP MAP



Diamant dans base huile

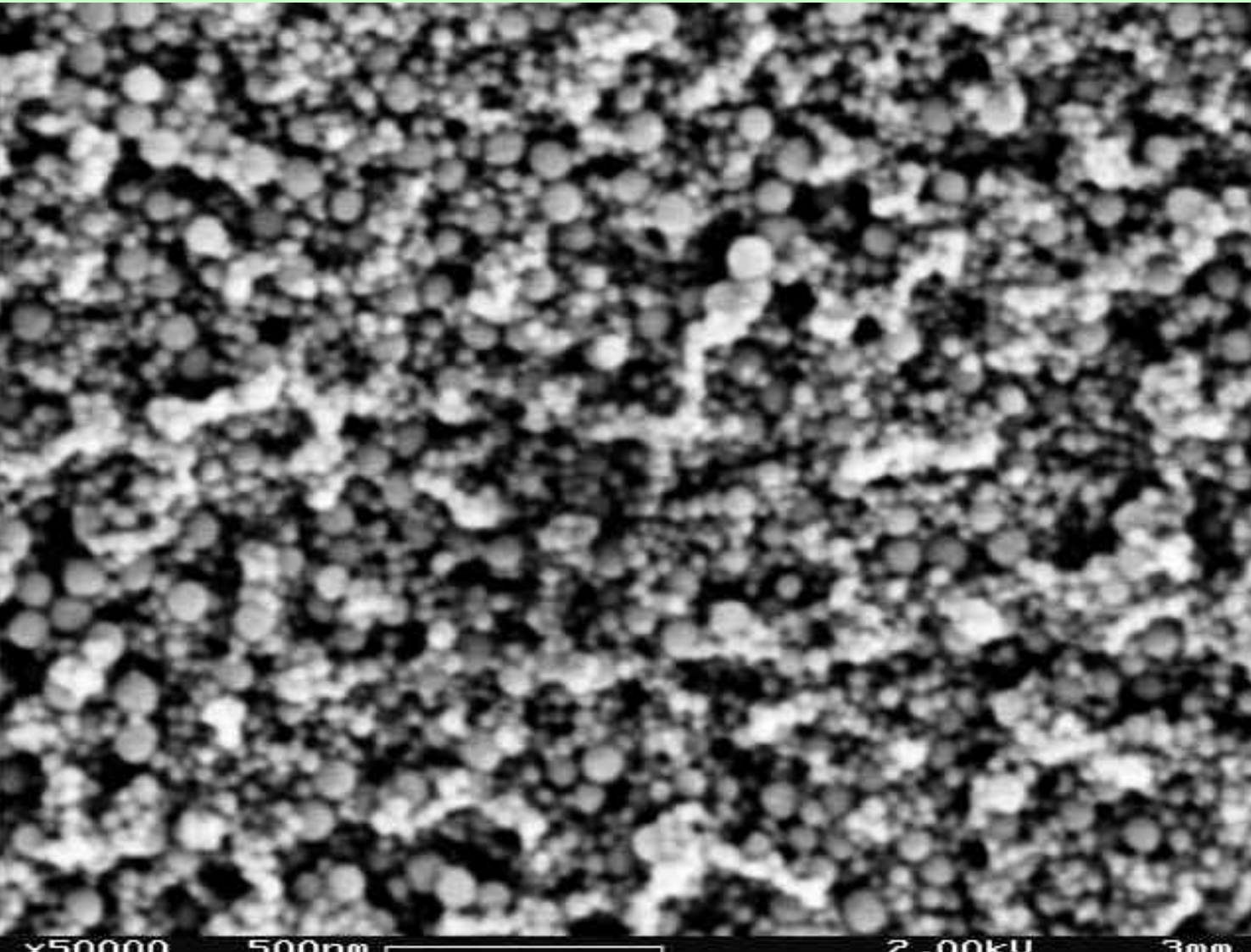
Full scale counts: 1689

9MONOHUI



Finition

Silice 0,1 μm



**Nettoyage : ultrasons avec
produits purs**

**Matériel : manuel ou
automatique**

artefacts

**Ne pas oublier la
métallographie**

