

# Workshop on Dust Charging and Beam-Dust Interaction in Particle Accelerators

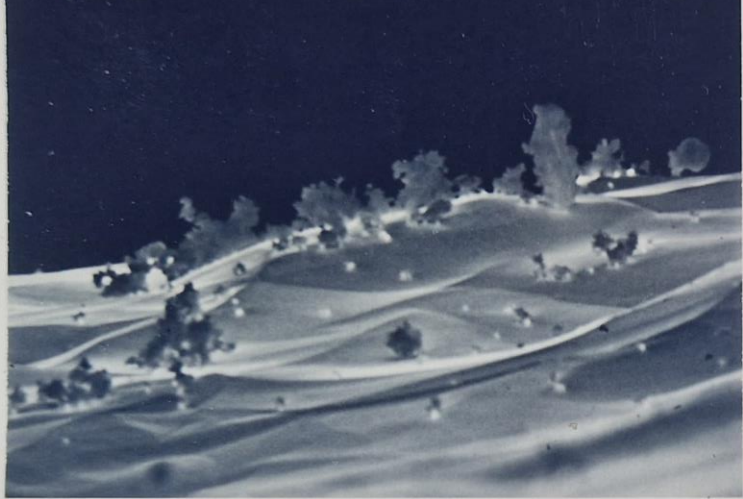
« *God made Matter, the surface was invented by the devil* »

The contamination of surfaces is a very complex phenomena which depends on complex interfaces between surfaces and the dusts, including their properties.



Wolfgang Pauli  
when expressing the complexity of a surface...

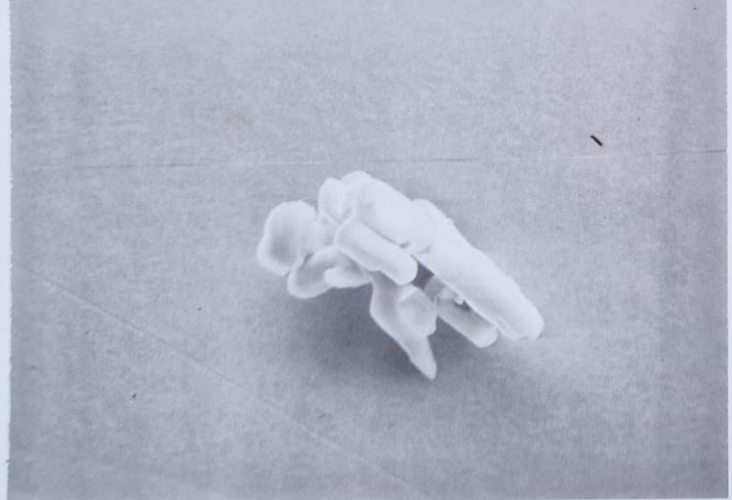
2,03KX 20KV WD:31MM S:25013 P:00004  
20UM



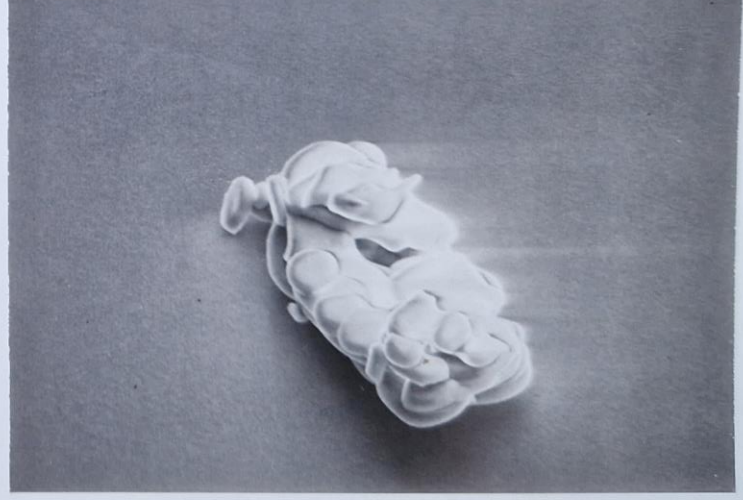
55,2X 20KV WD:29MM S:16122 P:00015  
500UM



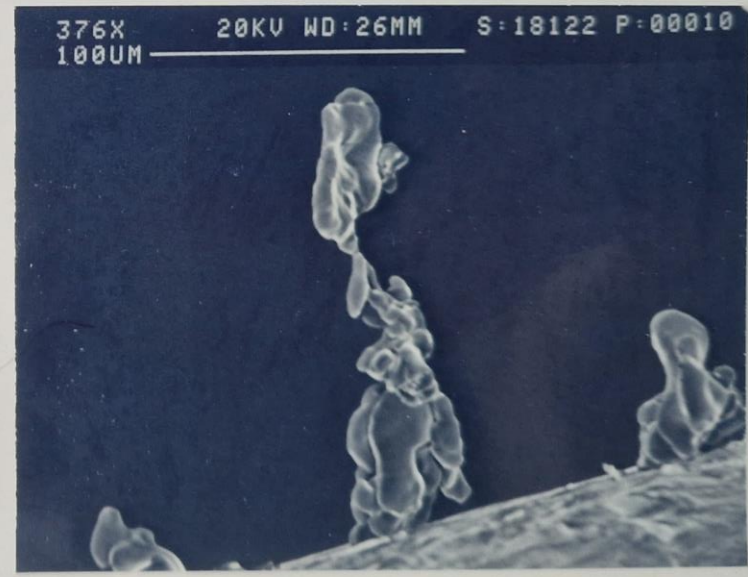
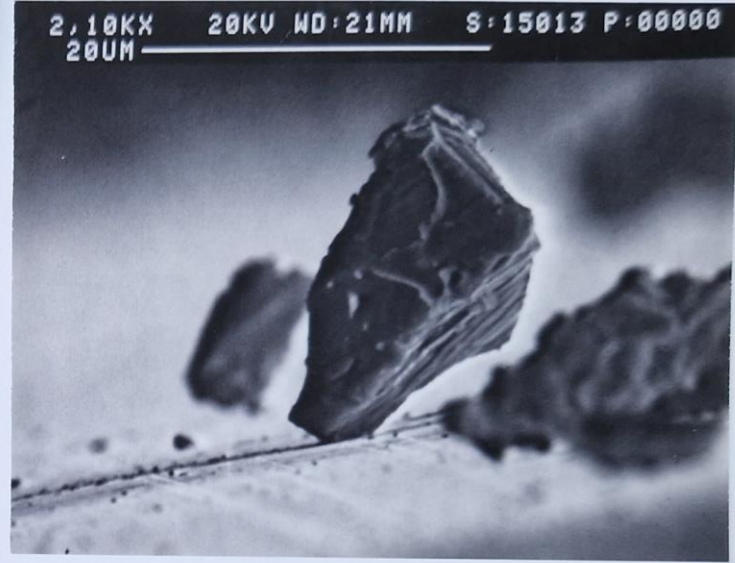
3,03KX 12KV WD:16MM S:00000 P:00000  
10UM



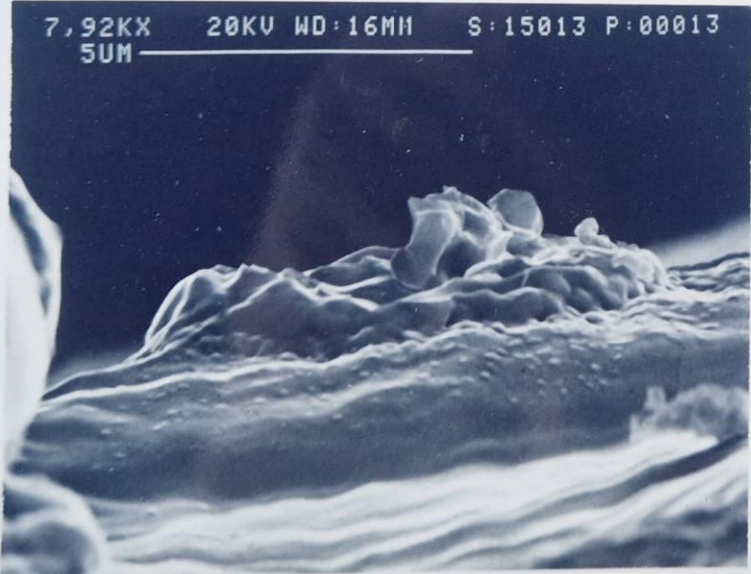
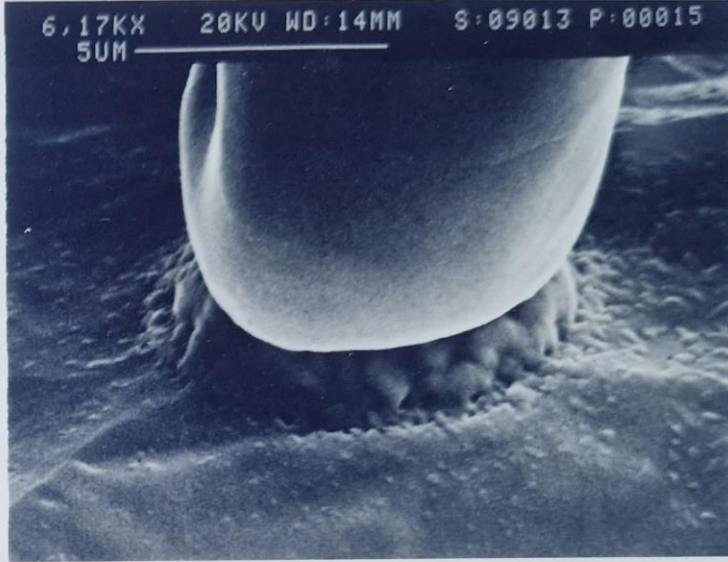
1,47KX 12KV WD:16MM S:00000 P:00002  
20UM



- Insulating and metallic (because of their oxide) particles tend to align with the electric fields.

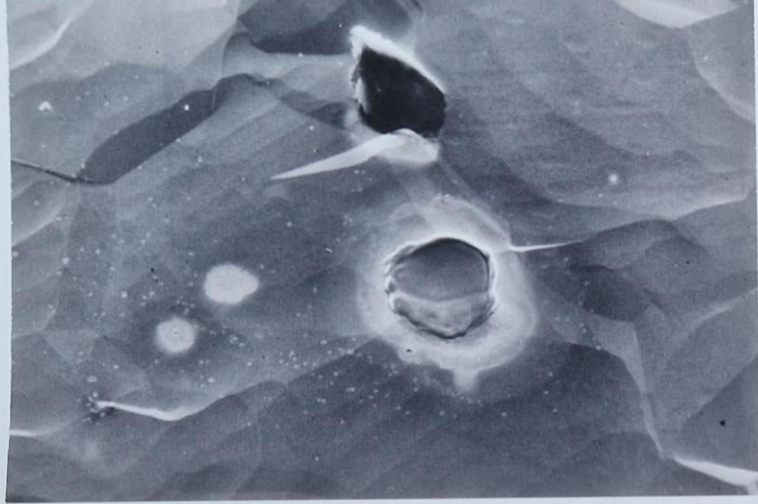


- And even piling up which can explain the electrical field local enhancement.



- Exposed to field emission, the particle can melt with low currents on a completely quasi adiabatic discharge.

499X 20KV WD:16MM S:00000 P:00026  
100UM

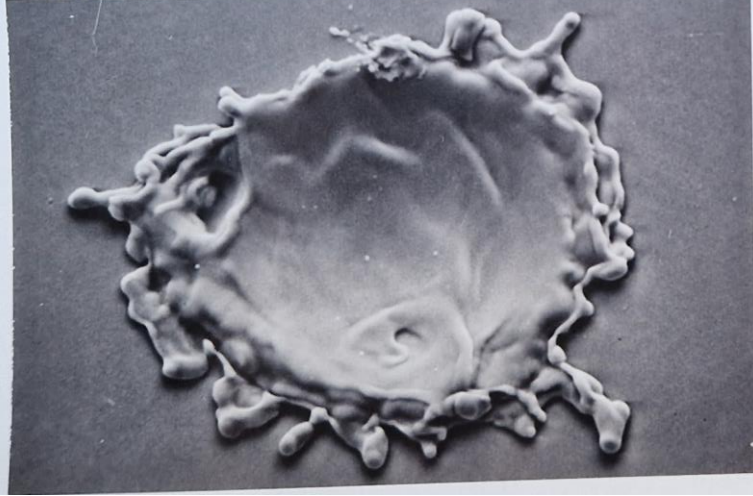


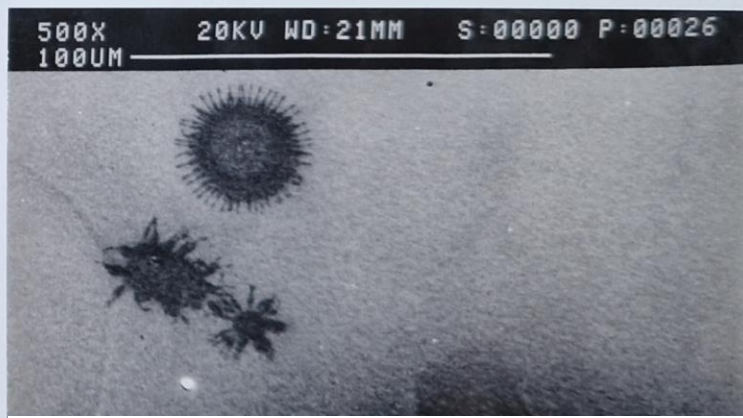
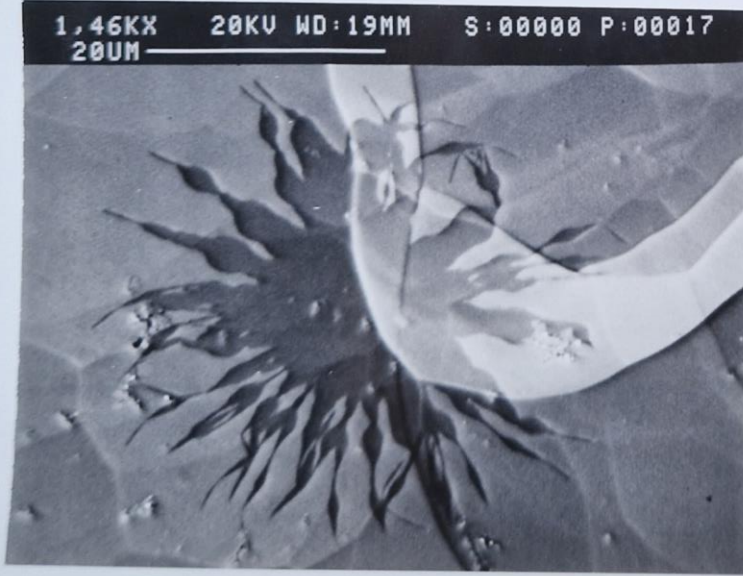
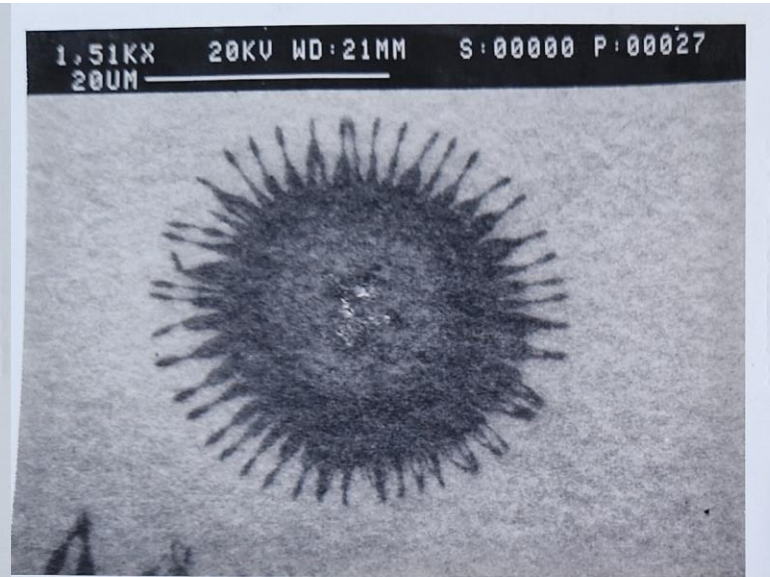
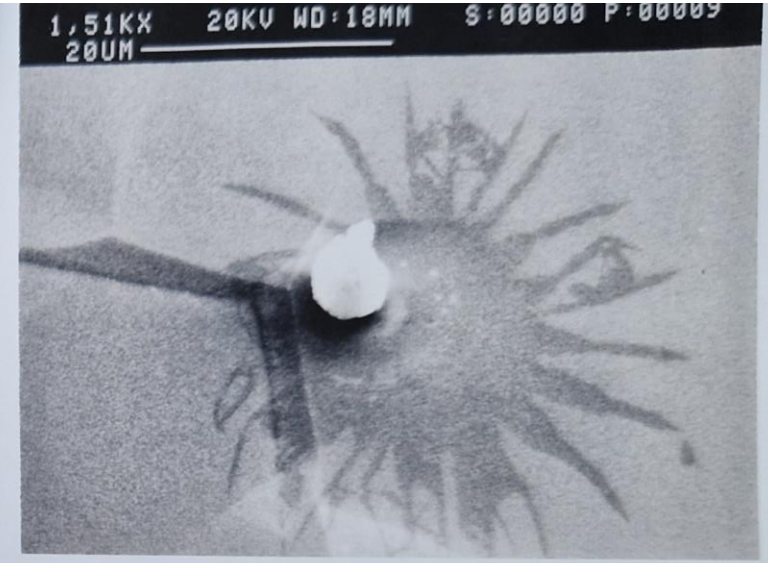
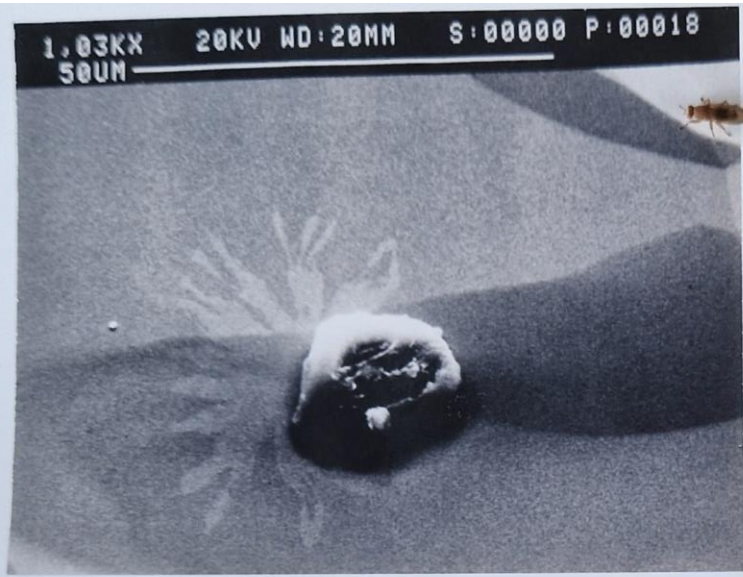
204X 8KV WD:15MM S:00000 P:00000  
200UM



- Arcing produces craters and pinholes depending on the energy liberated when the particle leaves the surface.

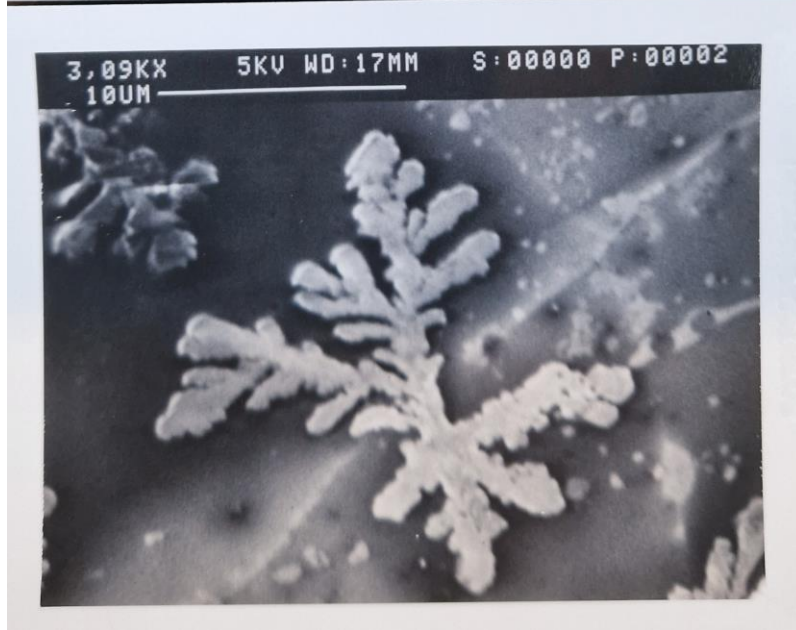
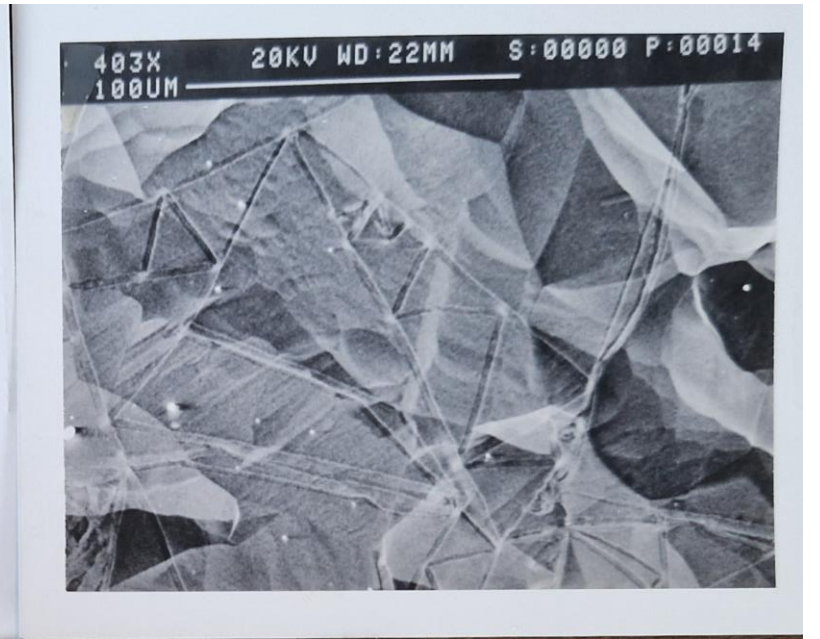
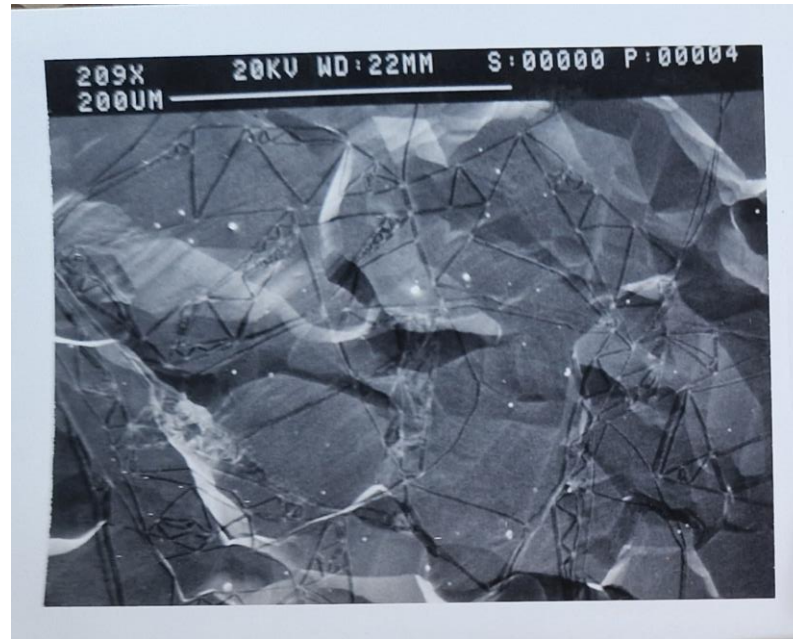
1,25KV 20KV WD:15MM S:011937 P:00000  
20UM





➤ And some times starbursts can be observed indicating a change of surface properties.





- And also unexpected traces such as frozen water in this example.
- And other types of surface breakdowns...

**Wish you a fruitful workshop**