

**Working Group FSW Processing**

**1st and 2nd of October 2007      Oskarshamn**

**EBSD studies of FSWed and  
FSPed copper in Helsinki University  
of Technology**

Helsinki University of Technology  
Department of Mechanical Engineering  
Laboratory of Engineering Materials

**Tapio Saukkonen**

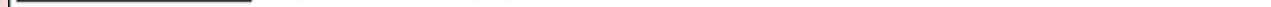
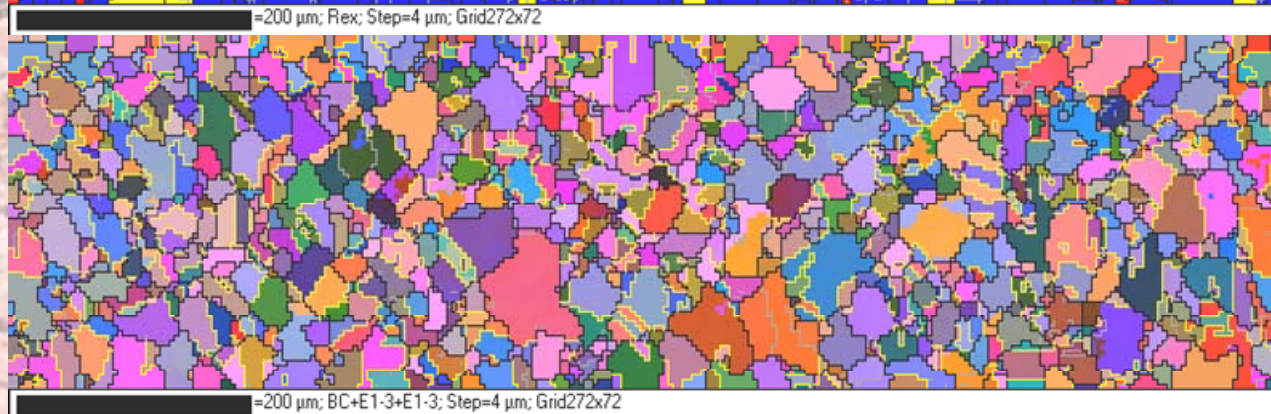
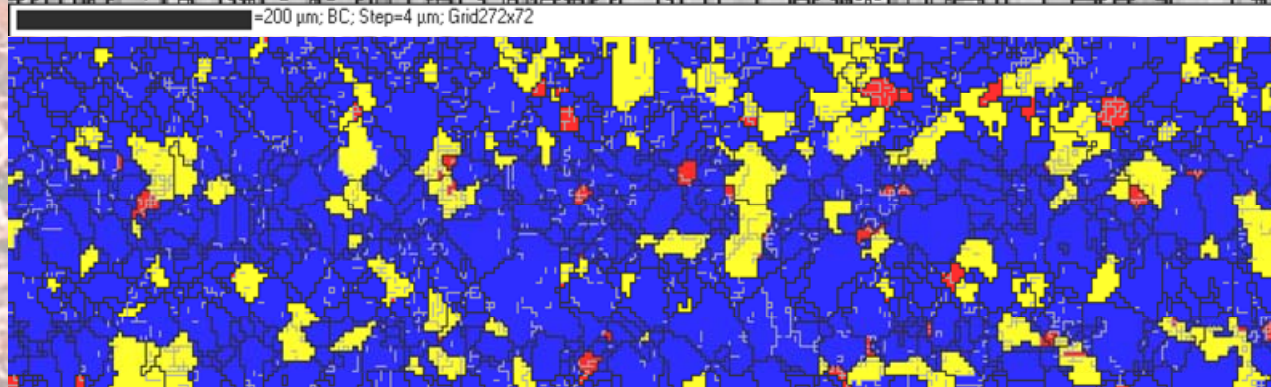
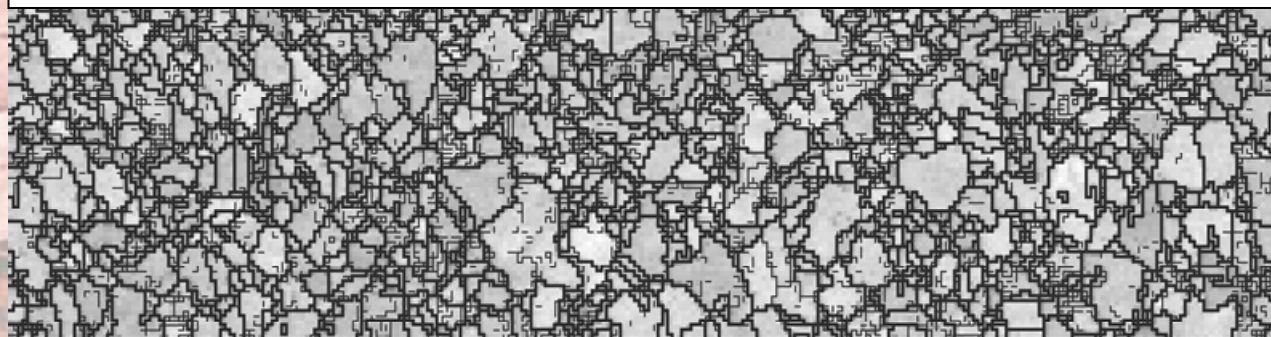
## Electron Backscatter Diffraction (EBSD) in Scanning Electron Microscope (SEM), an ideal method to study welds

- Large samples containing the whole weld area fit inside the SEM
- Small areas with high magnification can be mapped unattended and SEM runs automatically the stage to the next area covering in the end the desired area
- Grain size, grain boundary distribution, degree of deformation, texture, different phases etc can be determined

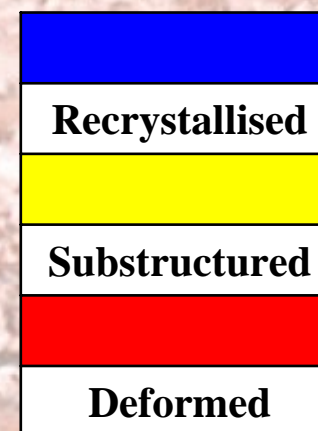
<= Surface

675 mm/min

Bottom = >



Grain Map



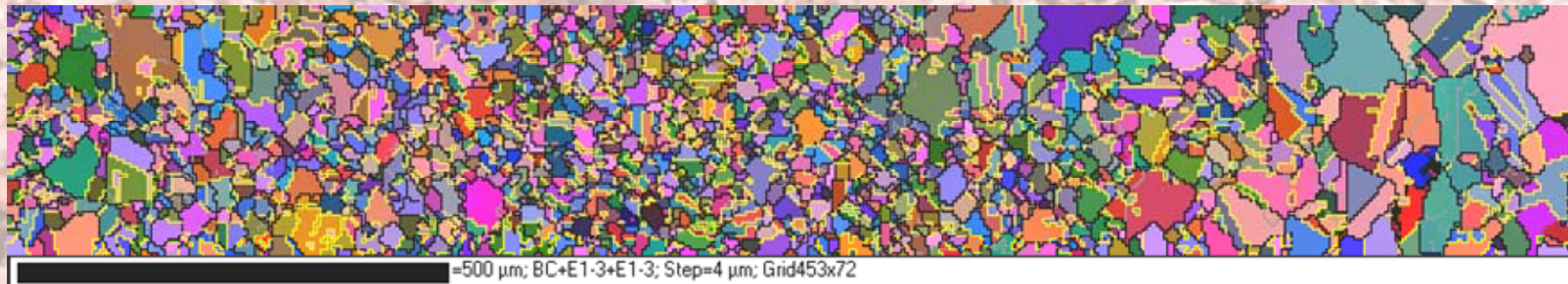
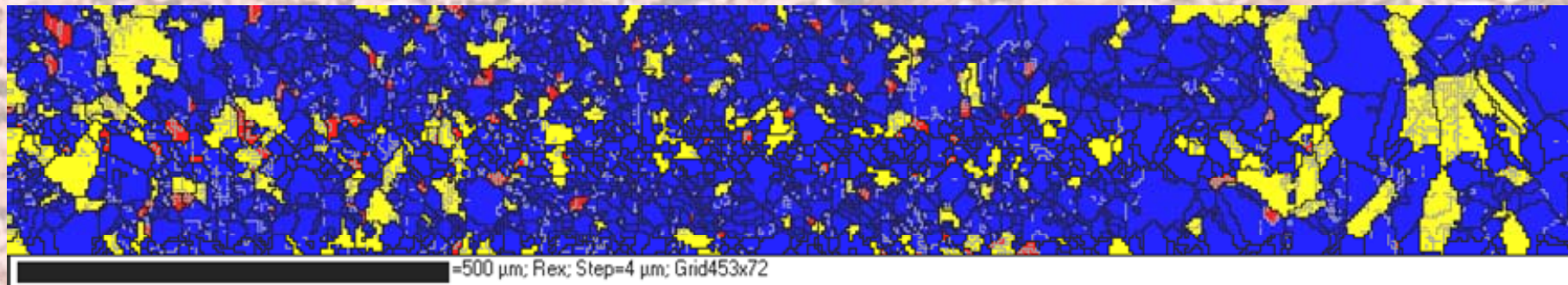
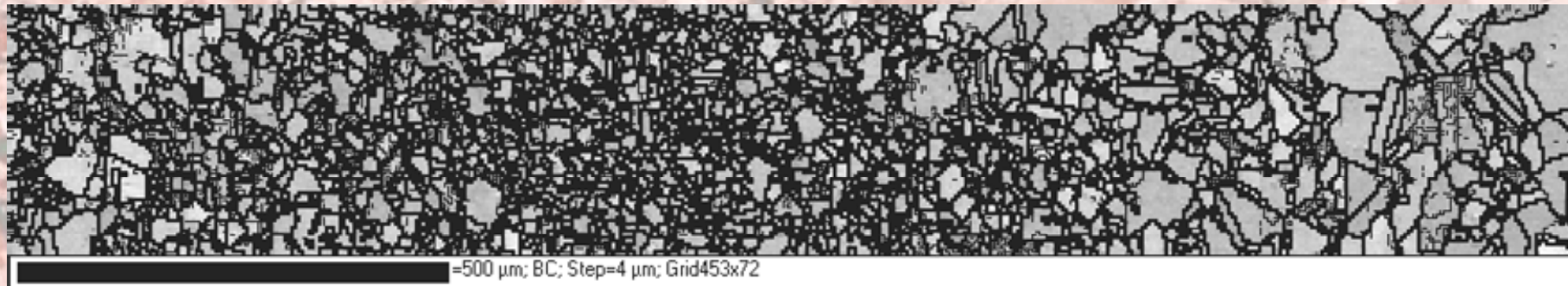
Twins 29 %

Orientation Map

Tool Pin =>

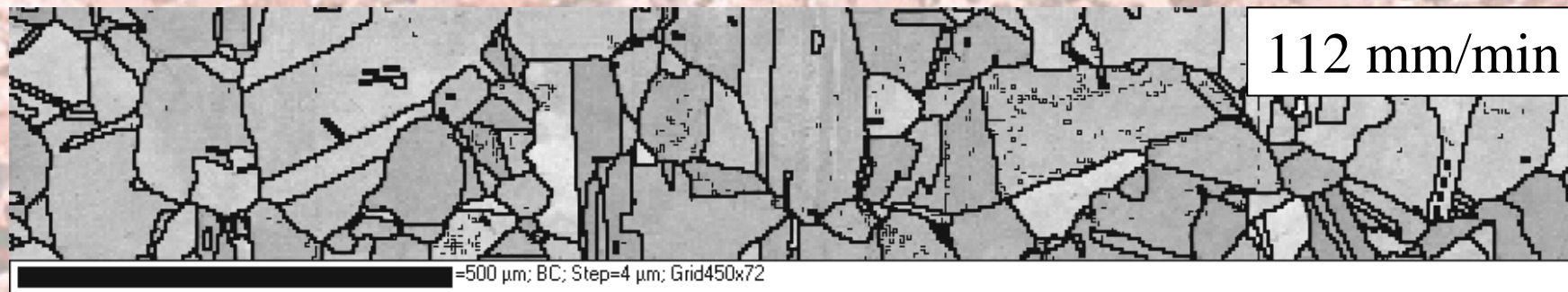
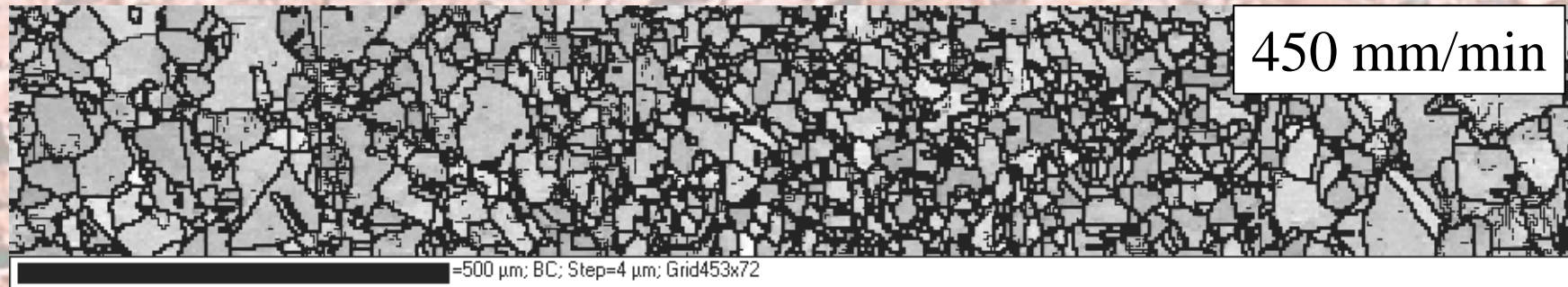
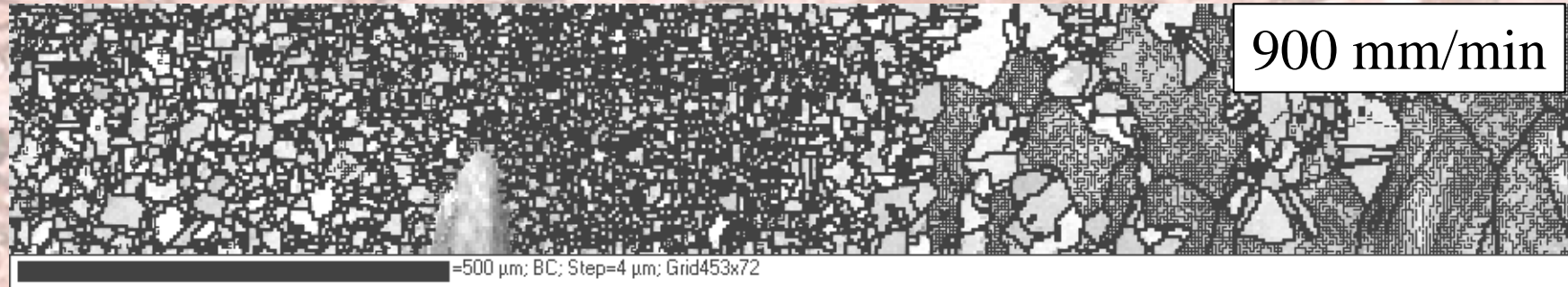
| Base Material Bottom =>

675 mm/min

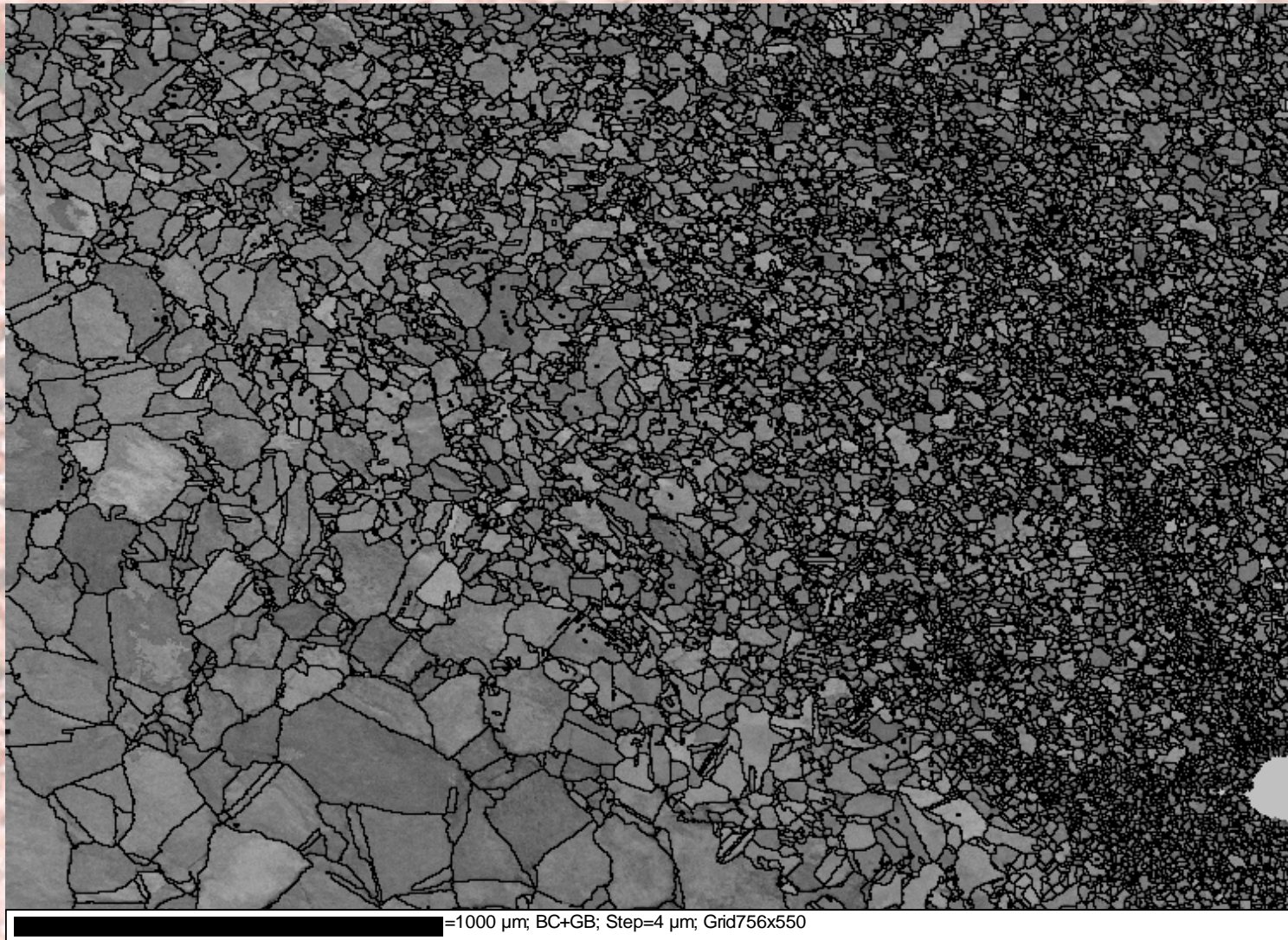


Tool Pin =>

Base Material Bottom =>

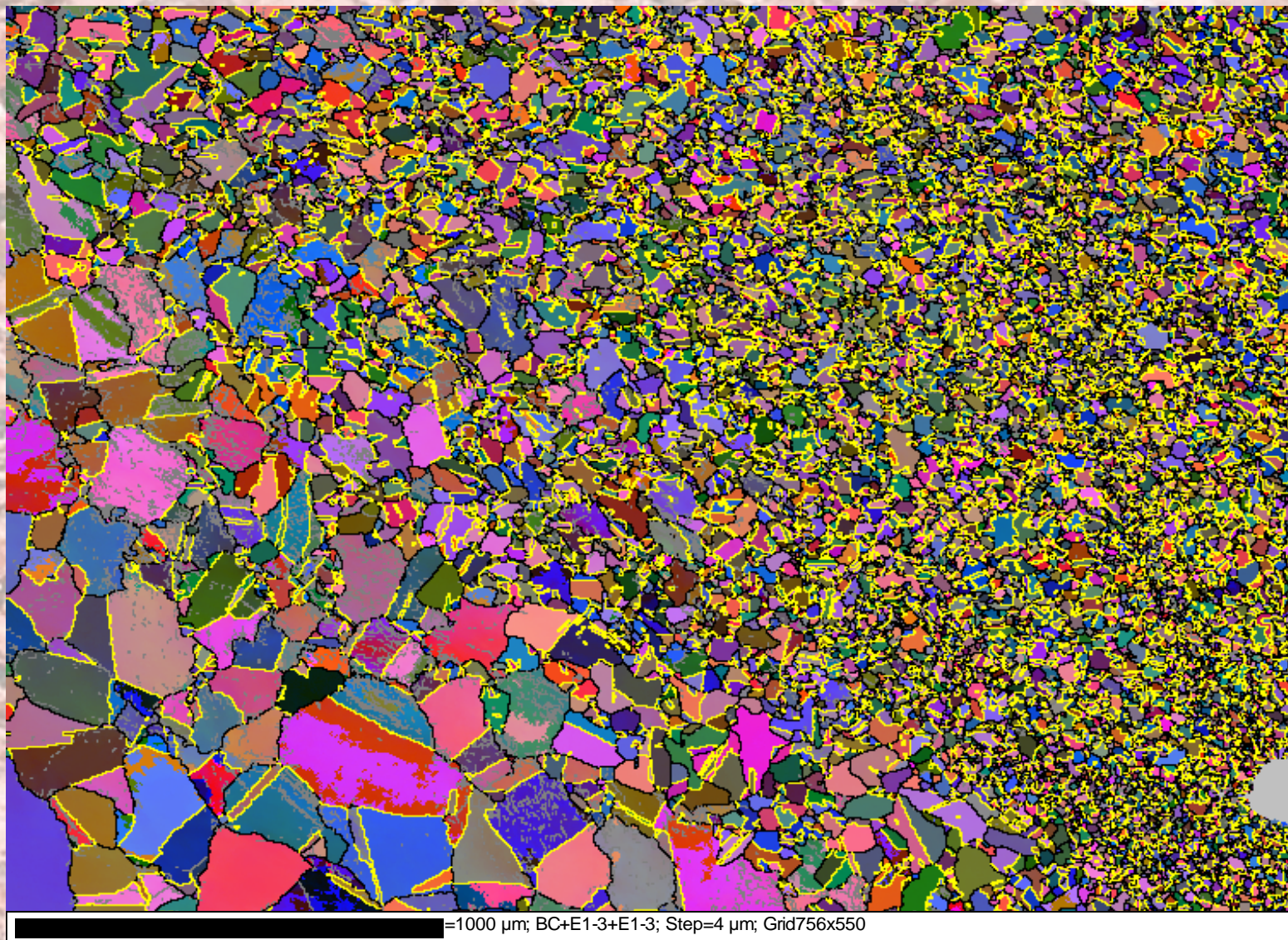


## Base material - weld of too cold FSWed copper, grain map



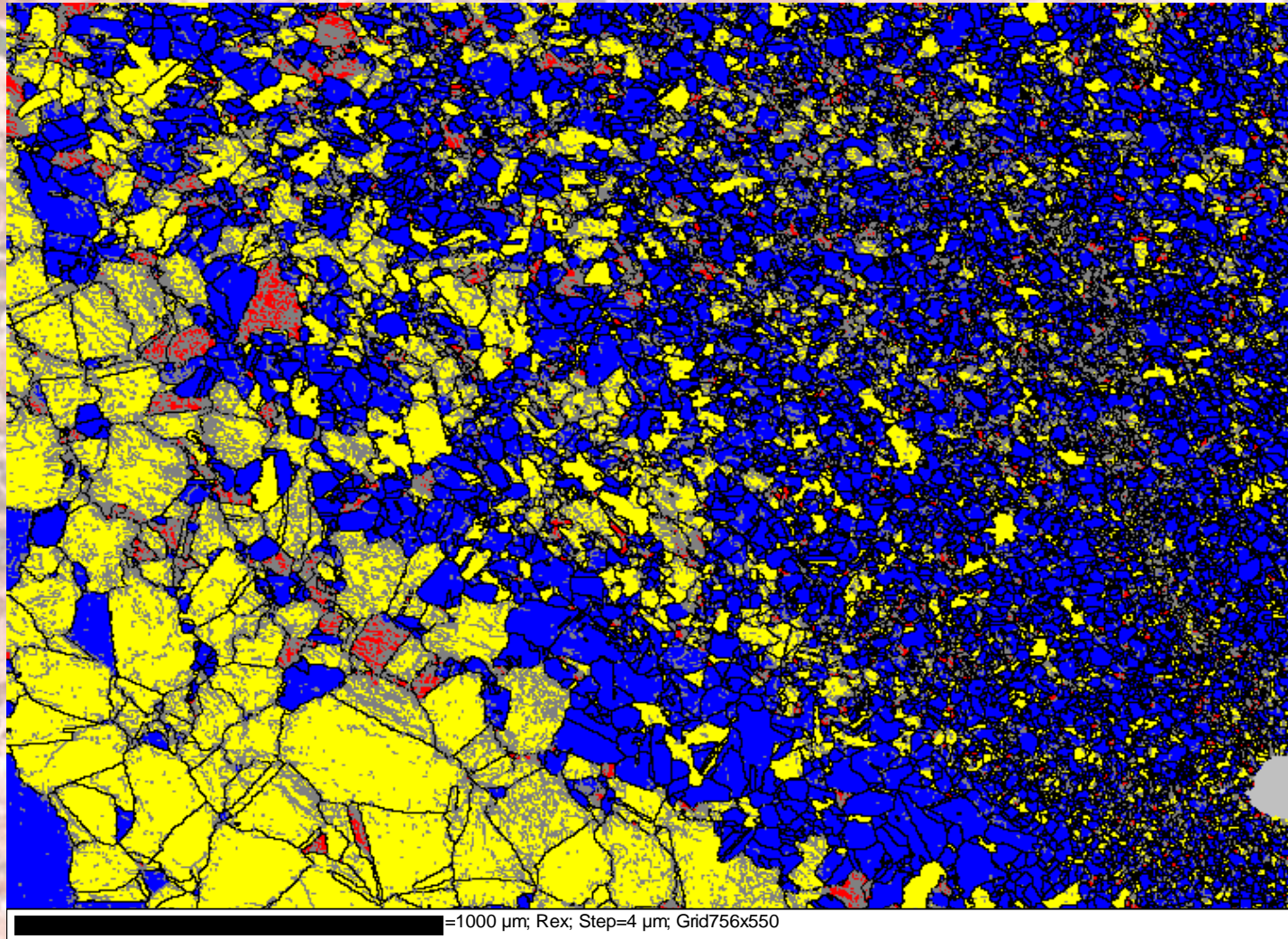
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Base material - weld of too cold FSWed copper, orientation + twin boundaries



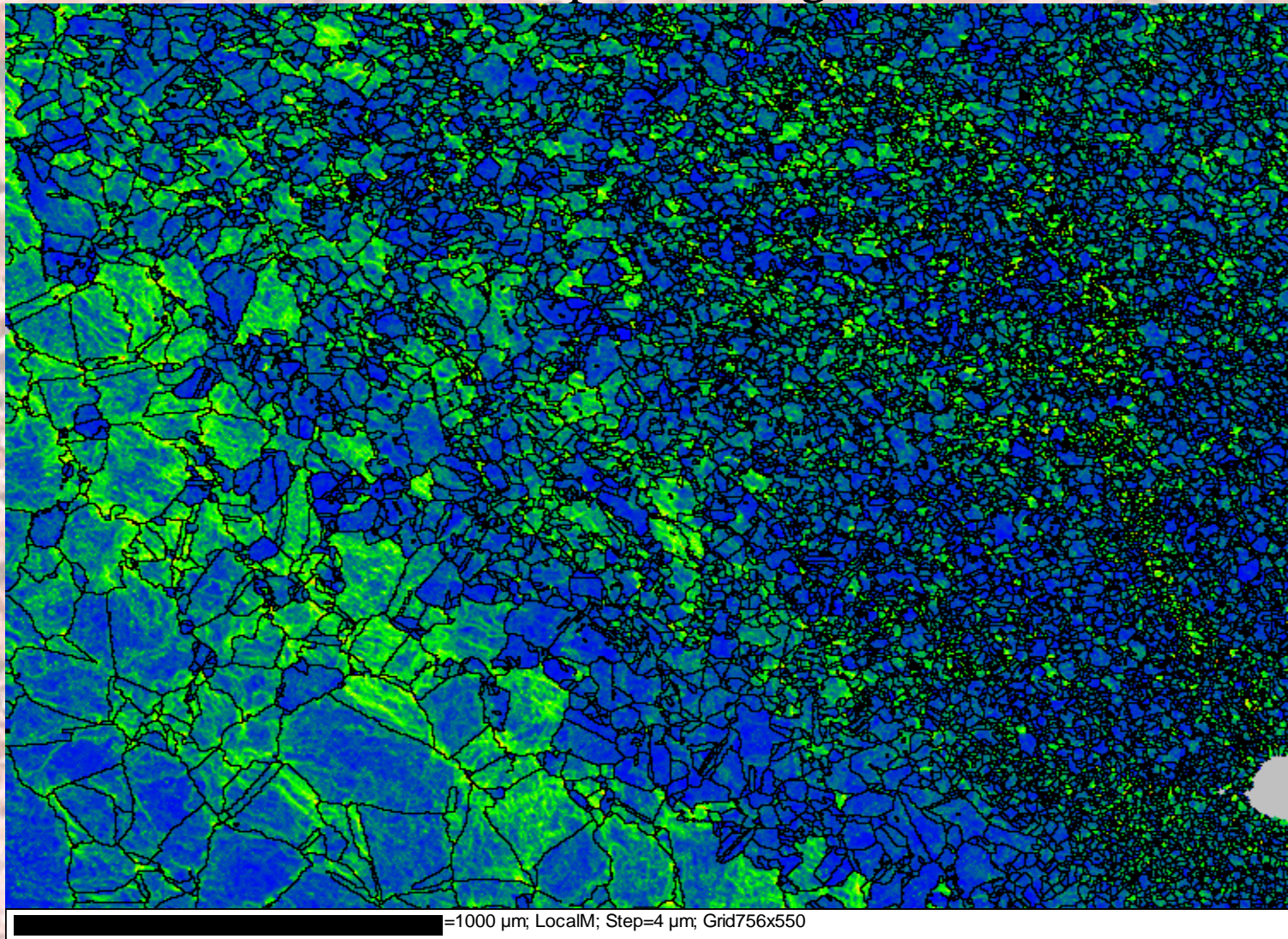
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Base material - weld of too cold FSWed copper,  
recrystallization-deformation map



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Base material - weld of too cold FSWed copper, local  
misorientation map indicating deformation



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