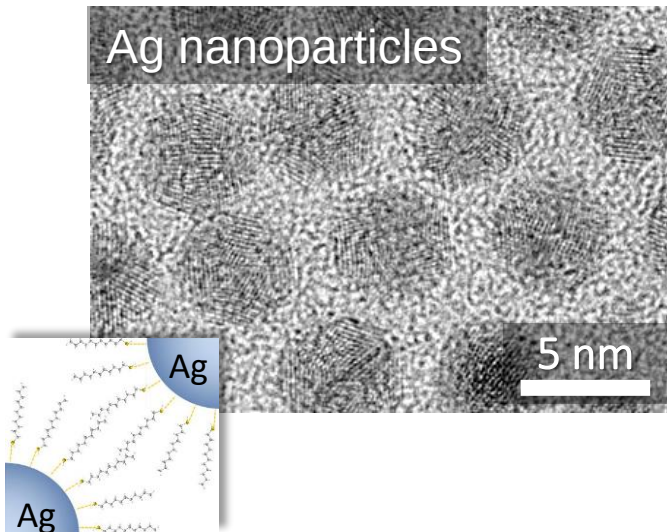


Interconnection with Ag nano ?

K. Suganuma
Osaka University



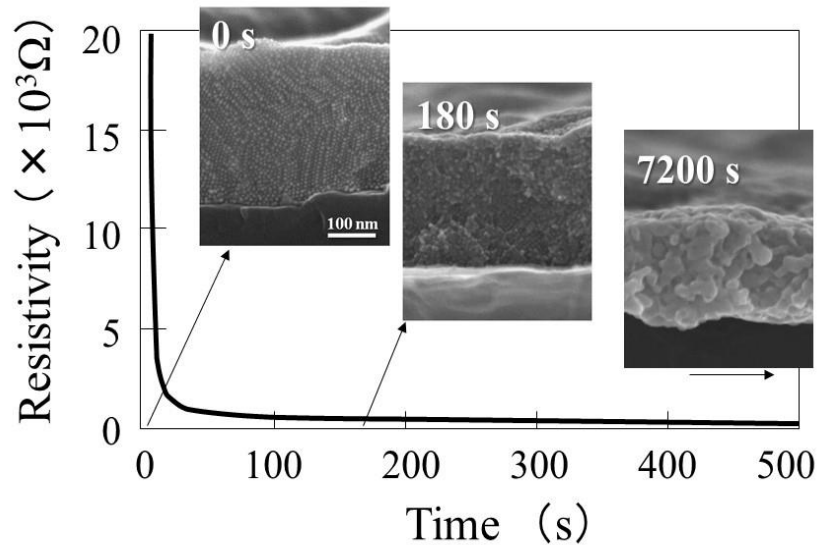
Benefits of nano-size

- ✓ Lowering sintering temperature
- ✓ Easy ink/paste formulation

Then, what about bonding ability?

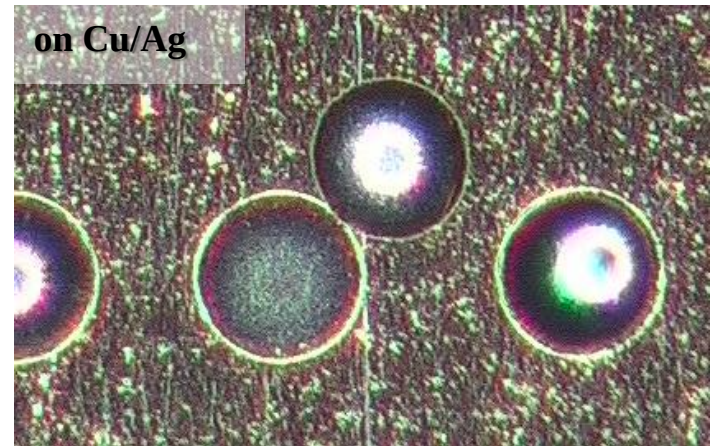
Can we do room temperature sinter joining?

Yes, we can do wiring!



Room temperature sintering after alcohol washing

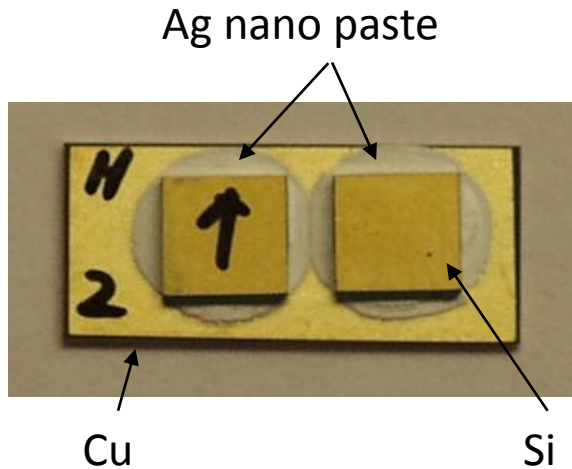
But, the bonding is weak!



We need high temperature $> 300^\circ\text{C}$
or high pressure

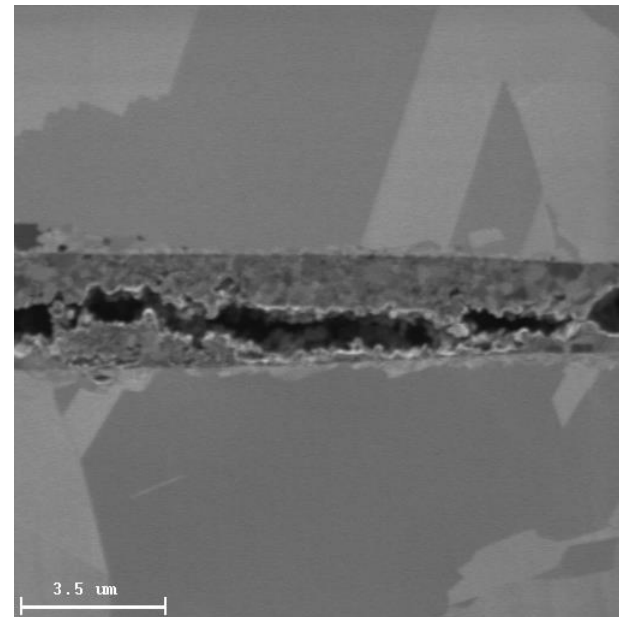
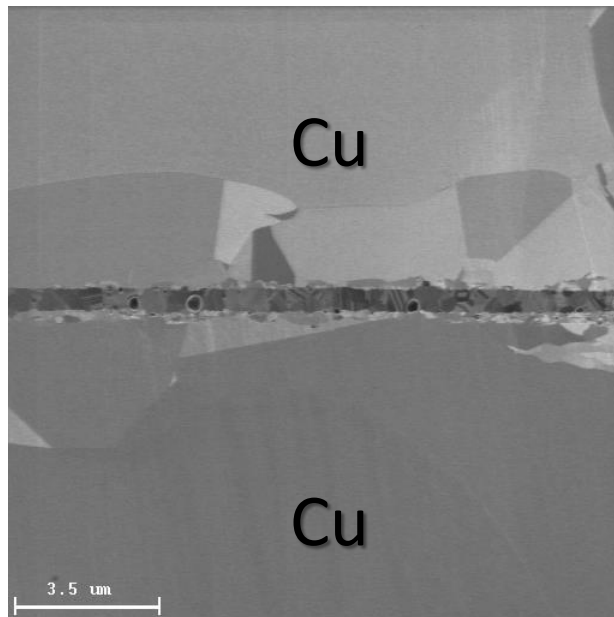
D. Wakuda, et al, Chem. Phys. Lett., 441(2007), 305

Uniformity problem

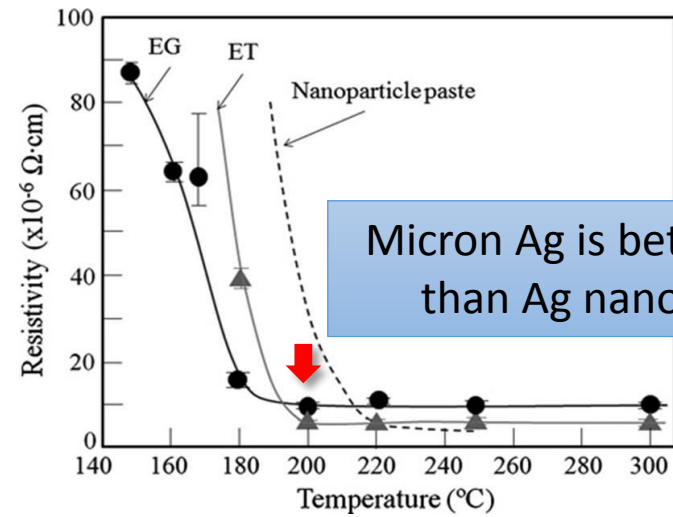
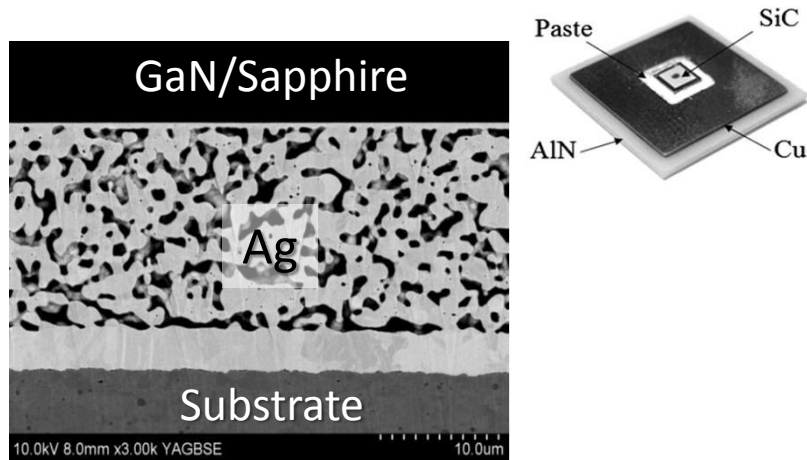


Too high temperature: 350 °C
30 min, 0.001 MPa, in vac

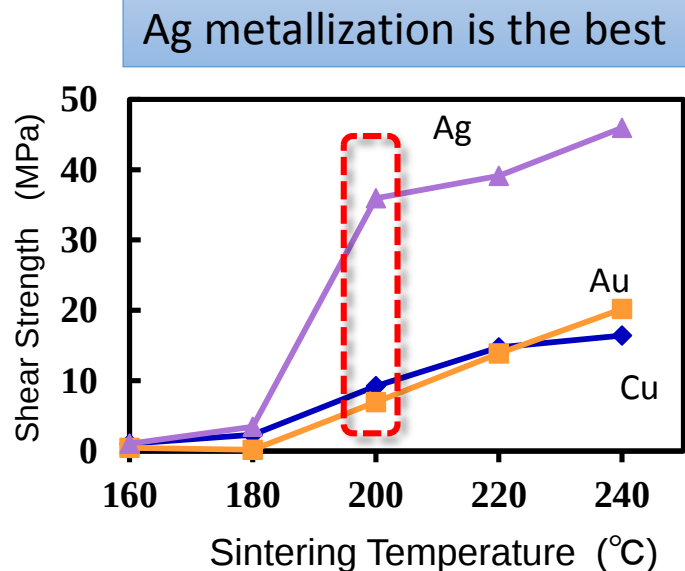
Even though strength is good
 $\sigma \approx 30 \sim 40$ MPa



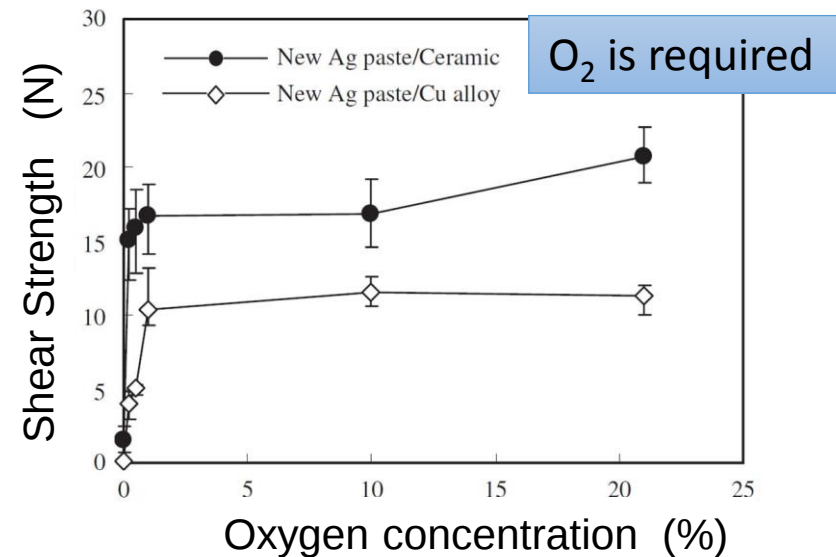
Micron size works at low pressure at 200 °C



Micron Ag is better than Ag nano



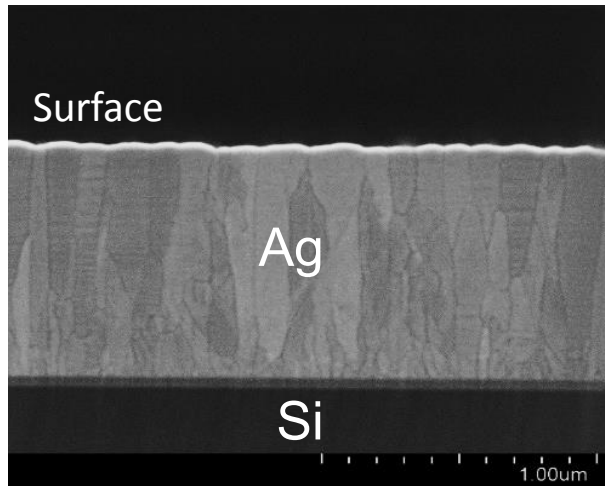
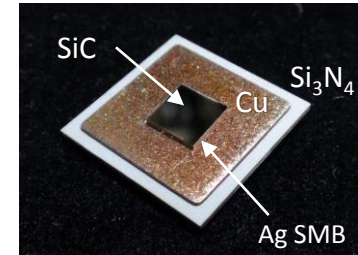
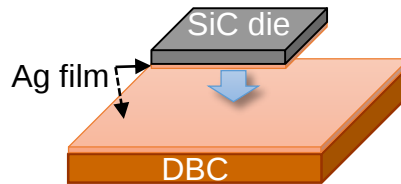
Ag metallization is the best



O_2 is required

Stress migration bonding

Stress migration in a Ag film forms a lot of Ag hillocks on the surface.



250 °C
in air
No pressure

