

D – wheel diameter; W – rim width; H – rim height

Fig. 1. A typical grinding wheel for silicon wafers.

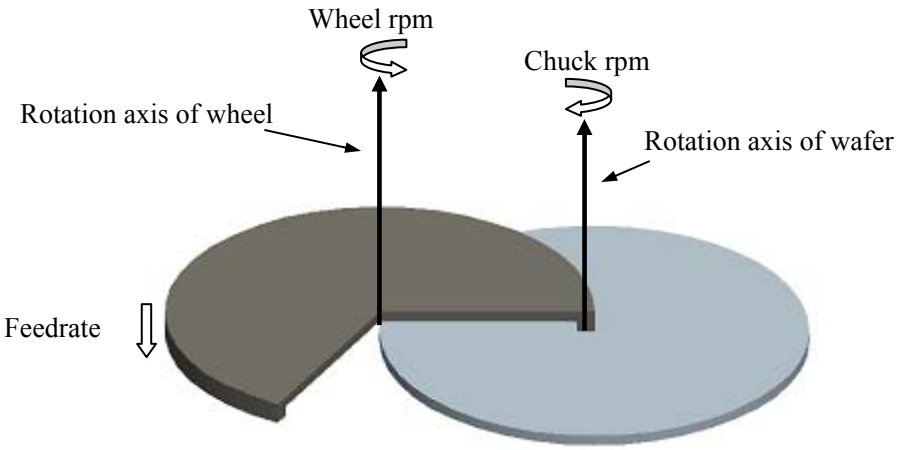
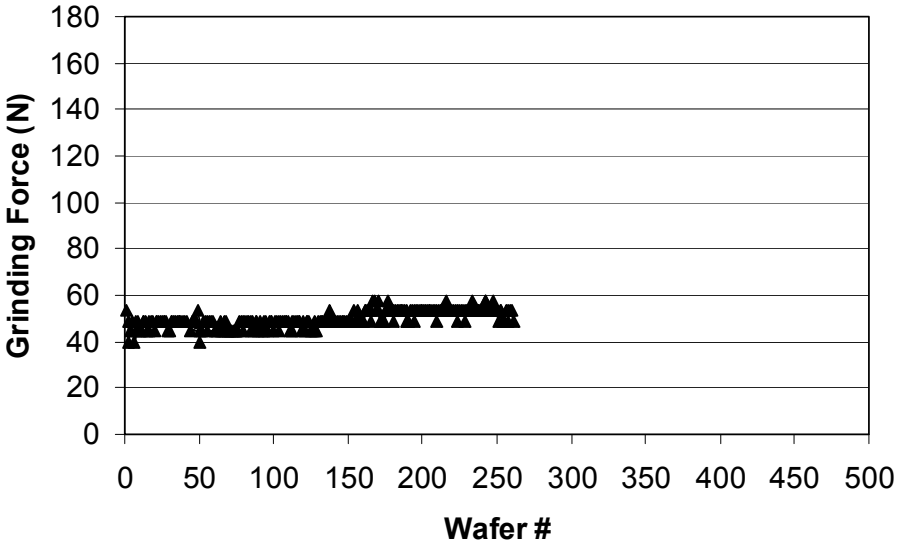
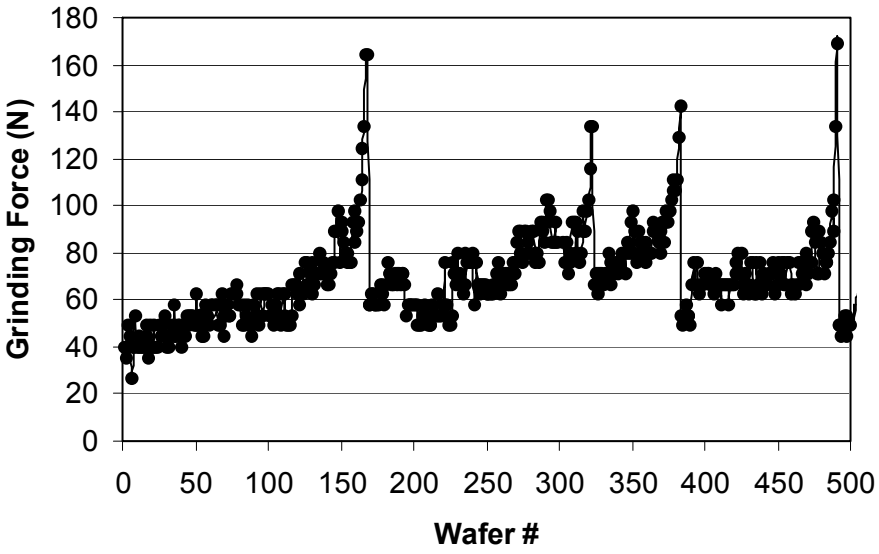


Fig. 2. Illustration of wafer grinding.

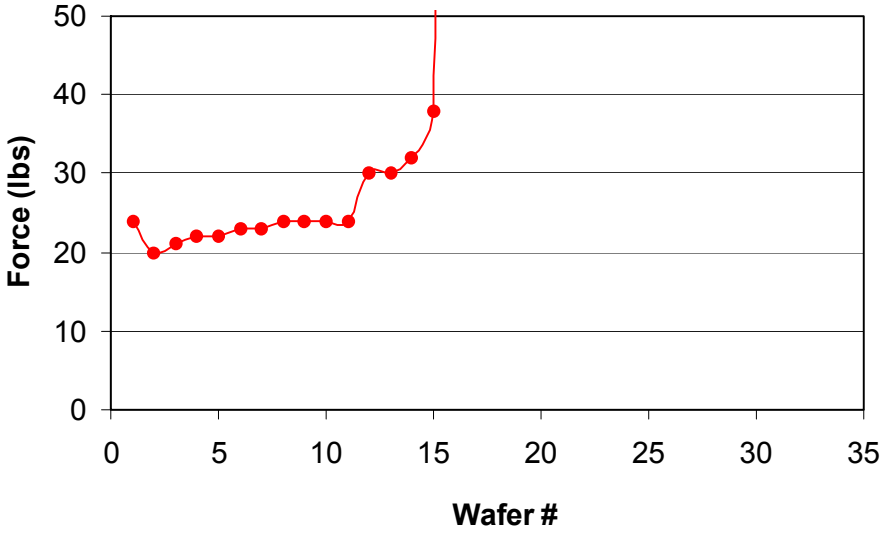


(a) Relatively consistent grinding force.

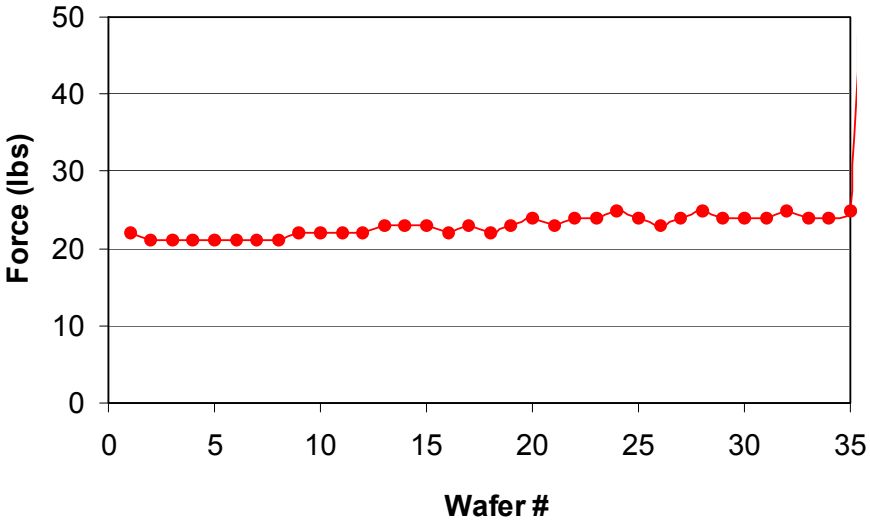


(b) Fluctuating grinding force.

Fig. 3. Consistent versus fluctuating force when grinding silicon wafers [6].



(a) Grinding force curve of a wheel without self-dressing ability.



(b) Grinding force curve of a wheel with self-dressing ability.

Fig. 4. Self-dressing ability indicated by grinding force curves [6].

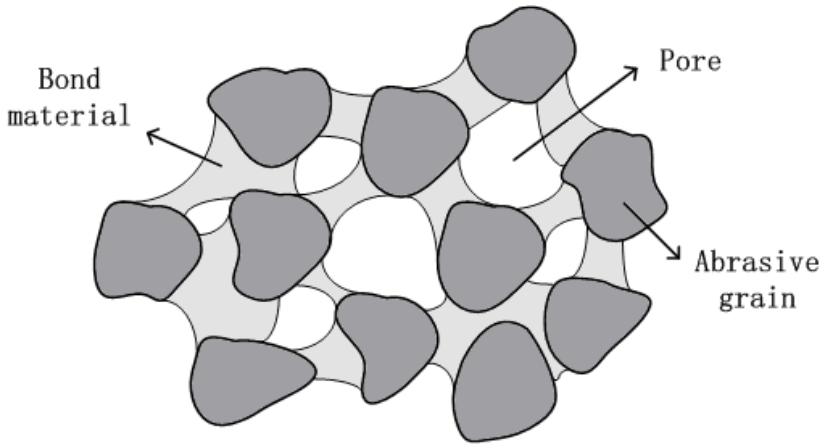
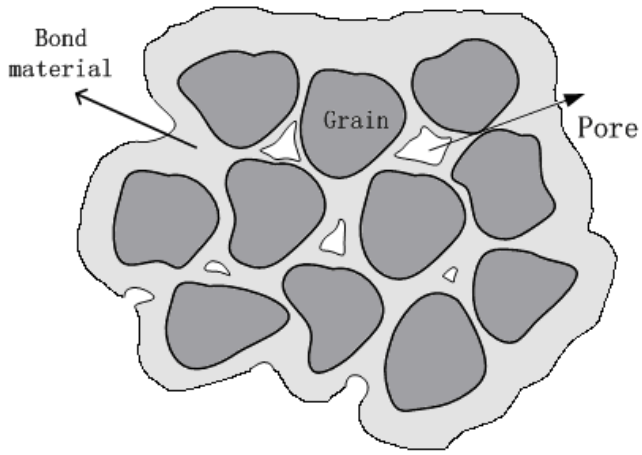
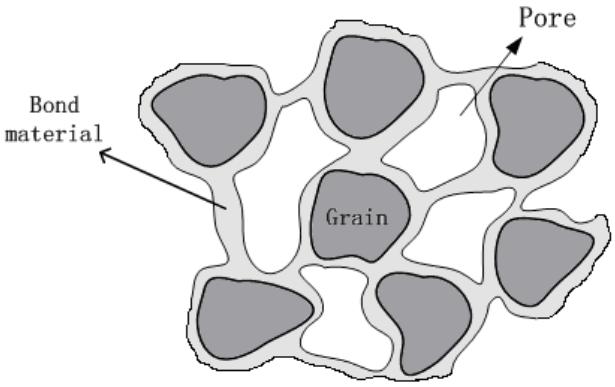


Fig. 5. Compositions of a grinding wheel (after [20]).

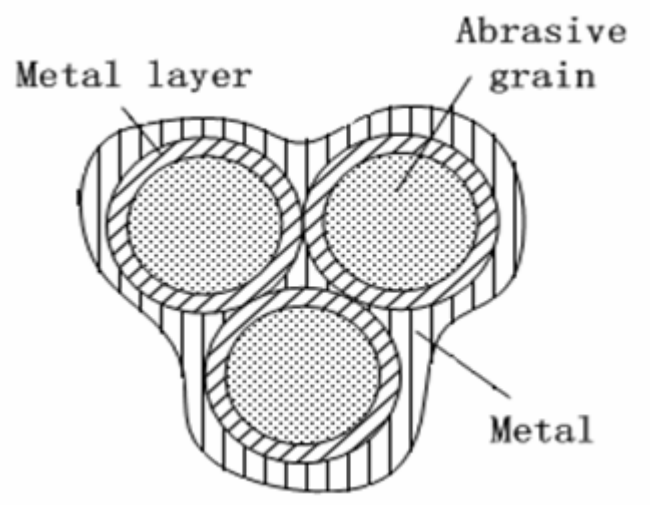


(a) Closed structure

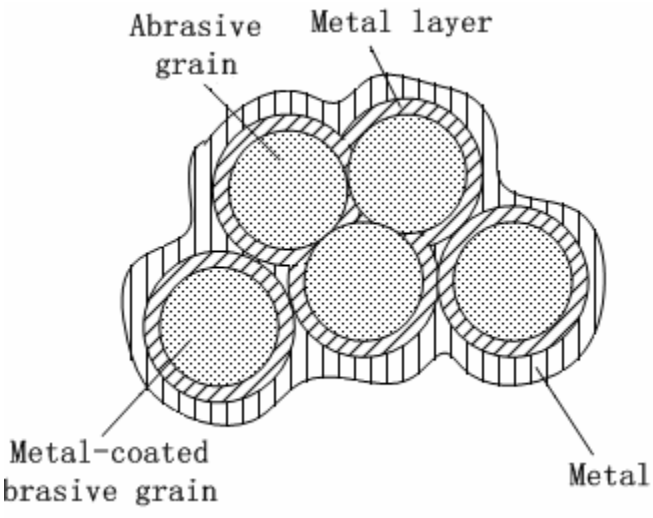


(b) Open structure

Fig. 6. Illustration of wheel structure (after [20]).



(a) Abrasive grains are individually coated before forming the agglomerate.



(b) Plural grains are coated together before forming the agglomerate.

Fig. 7. Metal-coated abrasive (after [32]).

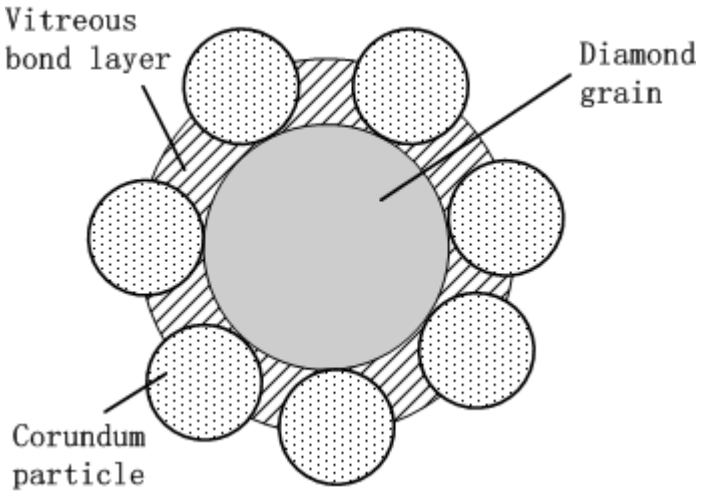


Fig. 8. Illustration of coating structure (after [31]).

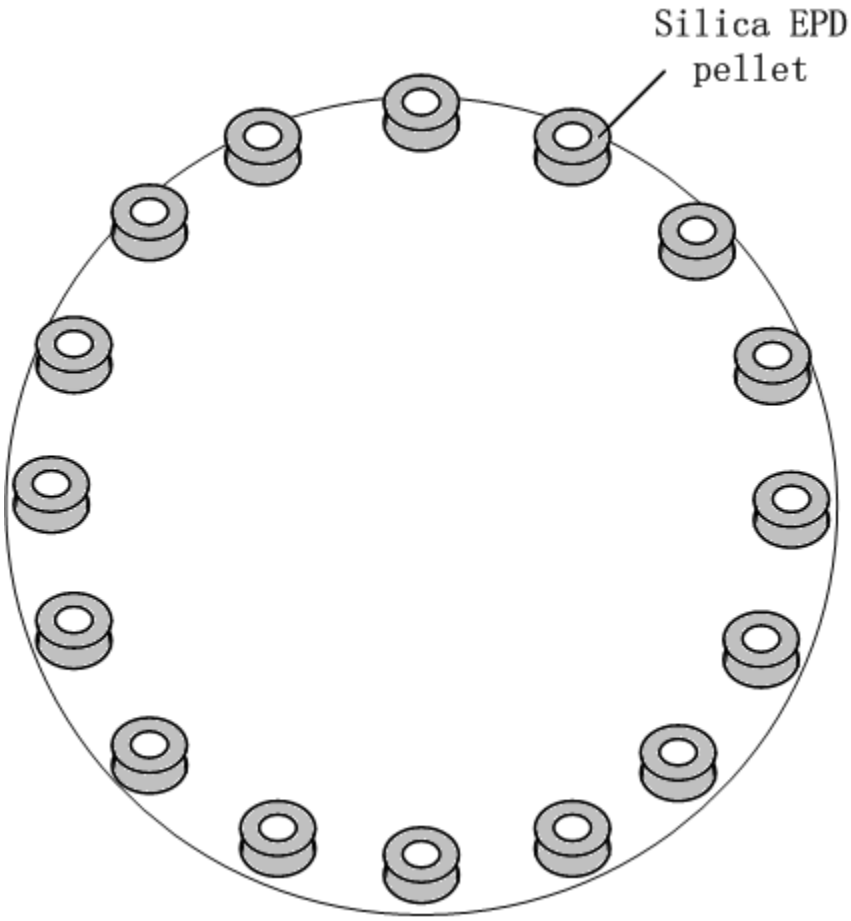


Fig. 9. Grinding wheel with silica EPD pellets (after [36]).

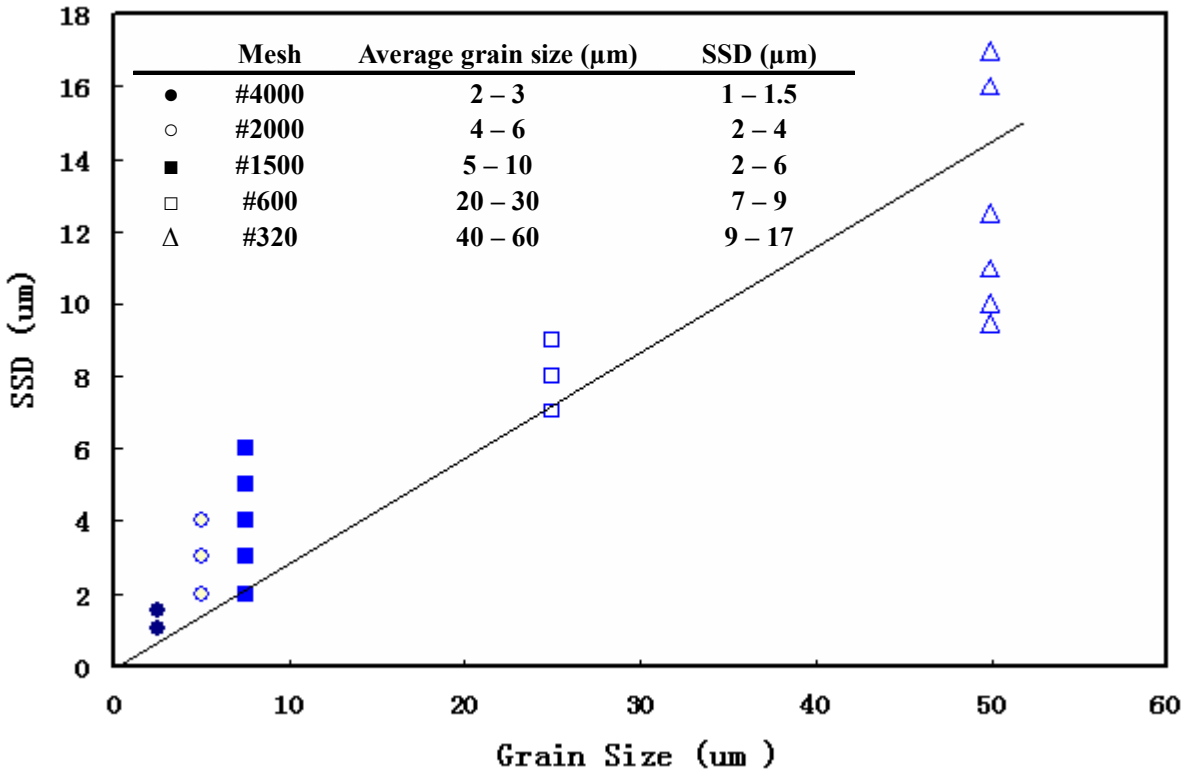


Fig. 10. Grain size versus subsurface damage (SSD) in ground wafers (after [11]).

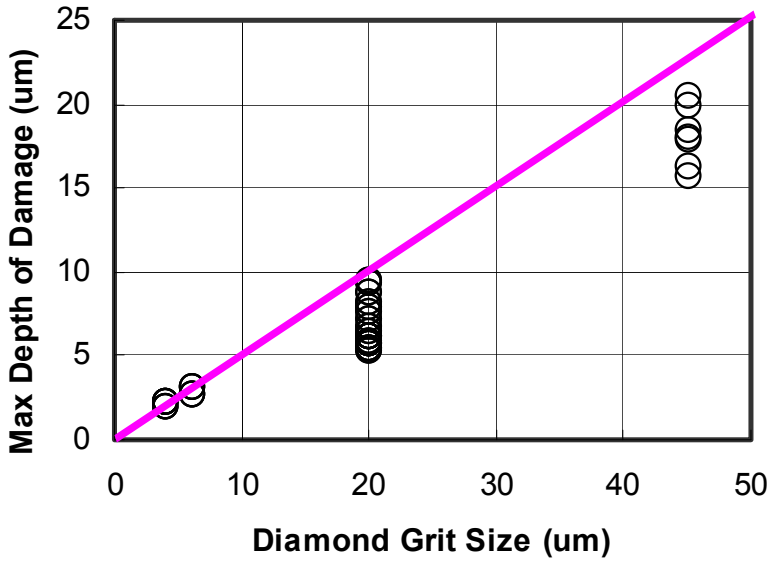


Fig. 11. Relation between grit size and maximum depth of cracks [12].

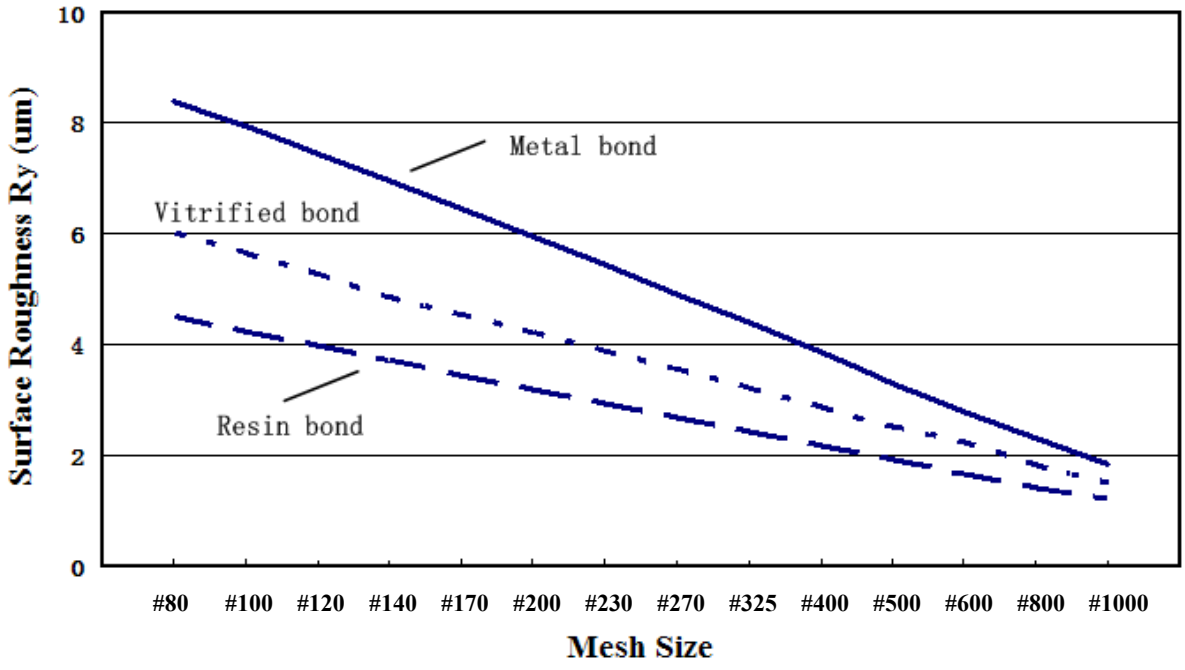


Fig. 12. Relationship between grain size and surface roughness when grinding ceramics (after [39]).

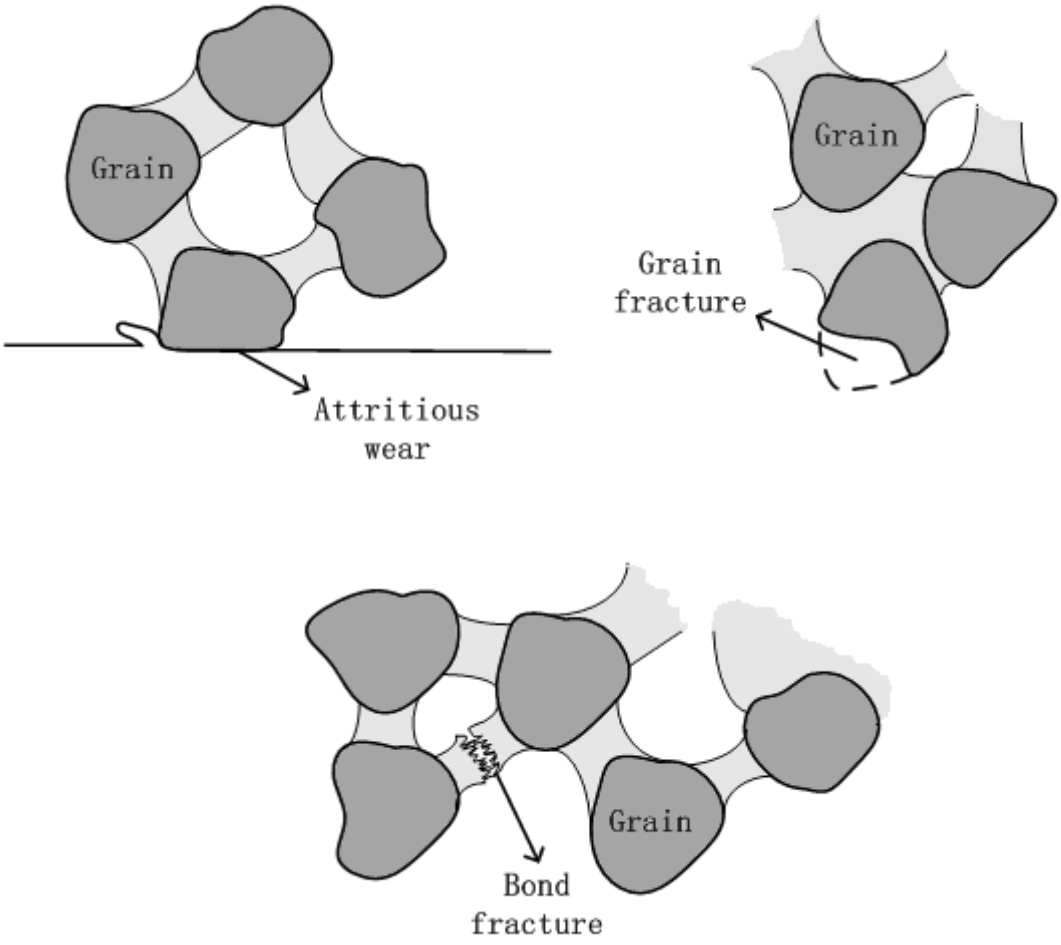


Fig. 13. Wheel wear mechanisms (after [47,23]).

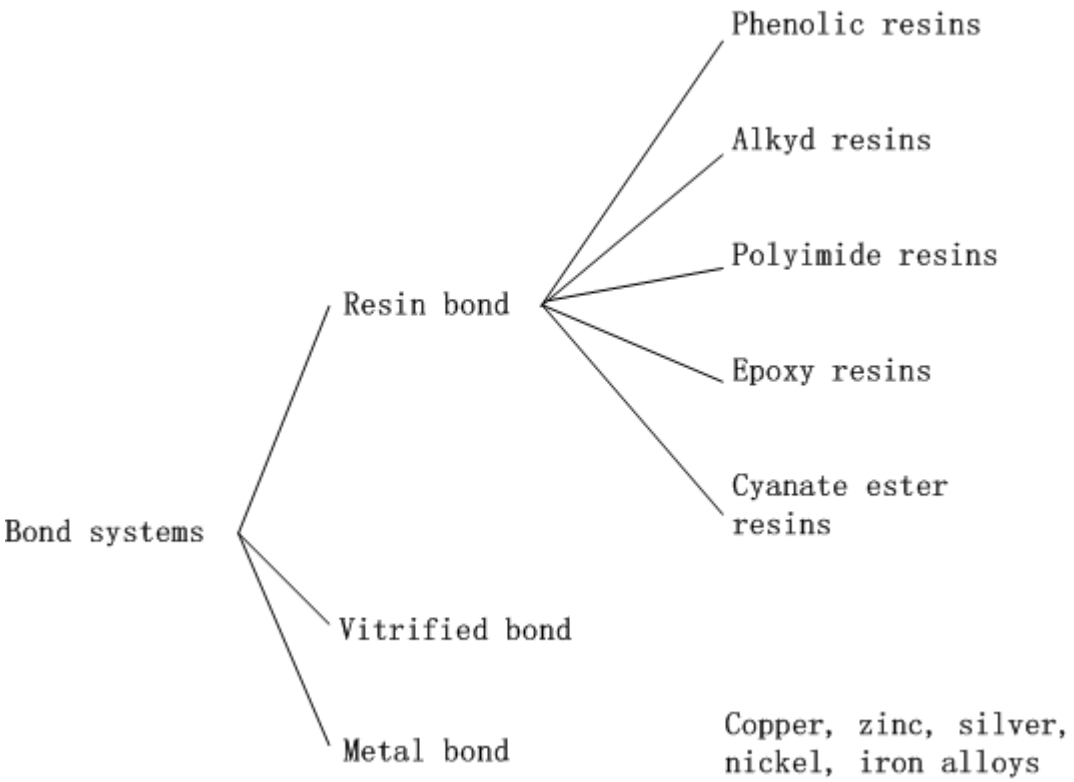


Fig. 14. Bond systems for grinding wheels (after [26,37]).

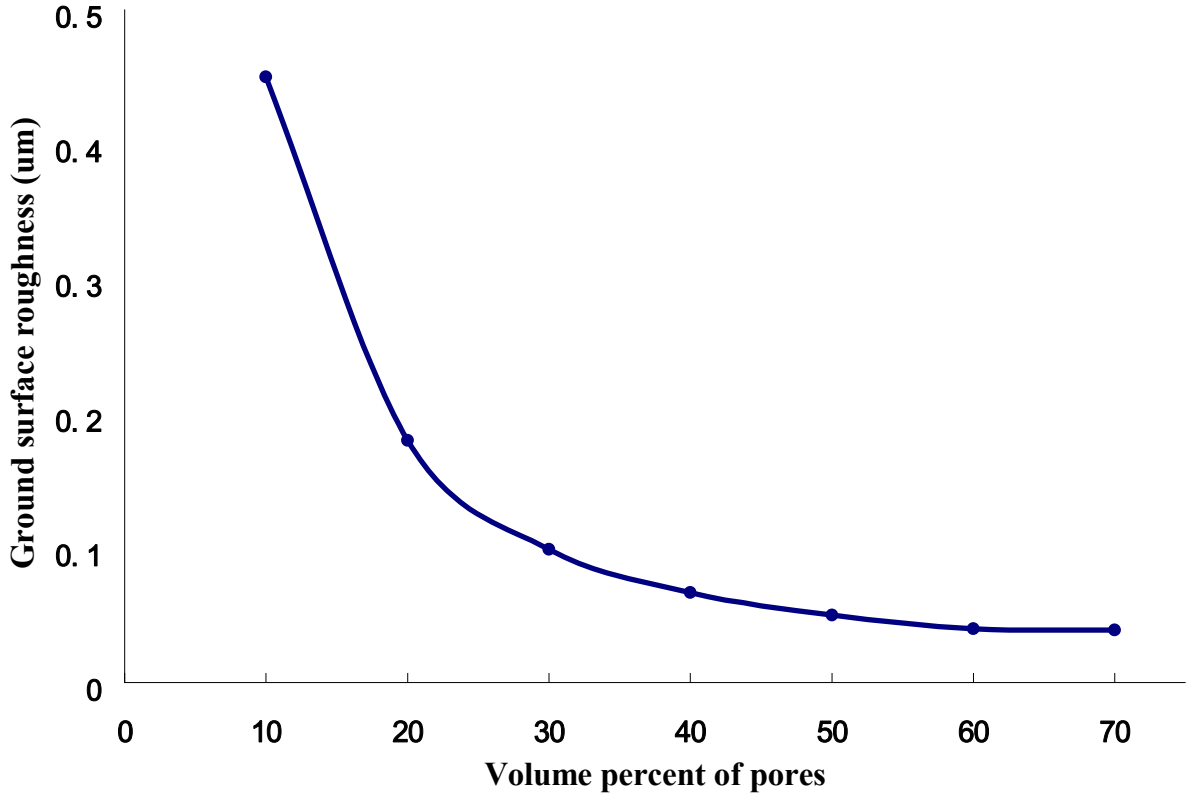


Fig. 15. Relation between the pore volume percentage in the wheel and the surface roughness of the ground wafers (after [61]).

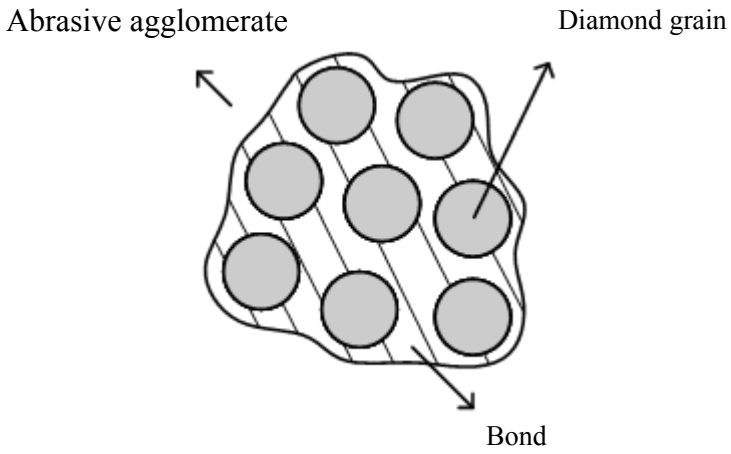
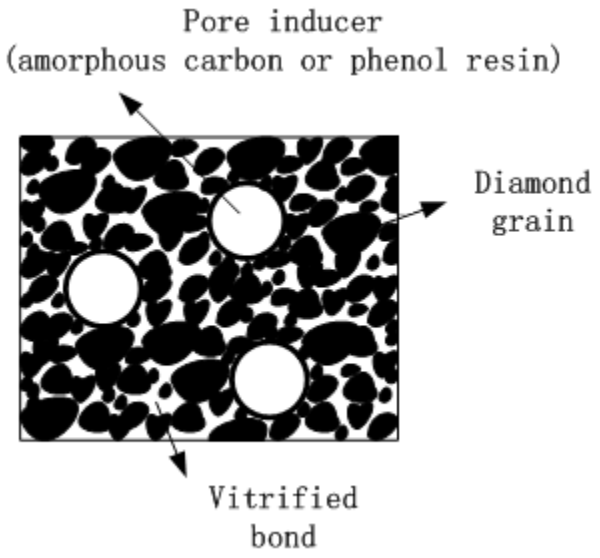
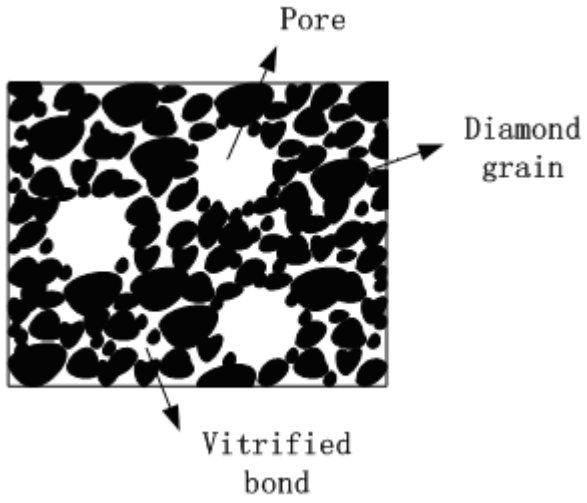


Fig. 16. Abrasive agglomerate.

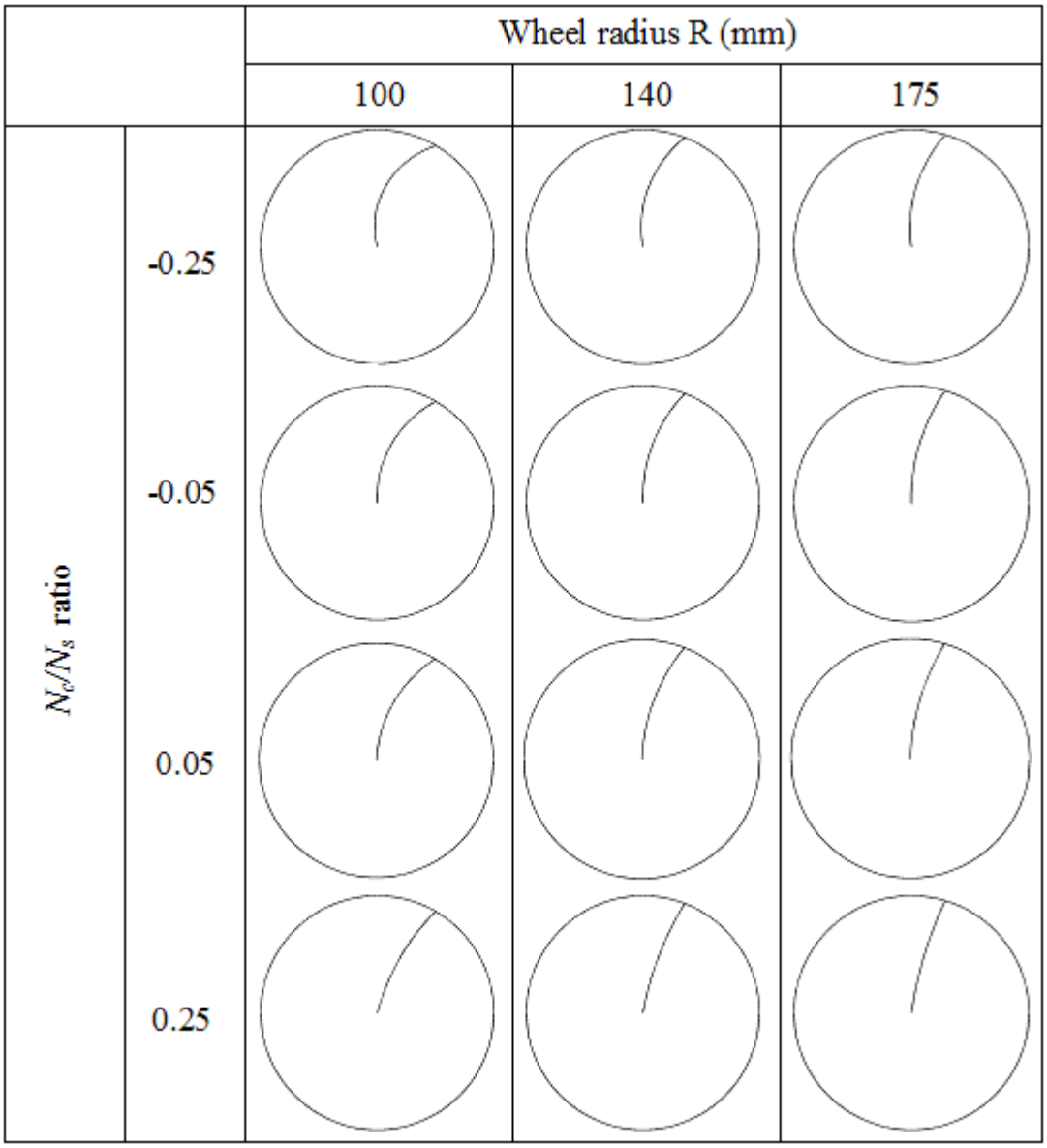


(a) Before sintering



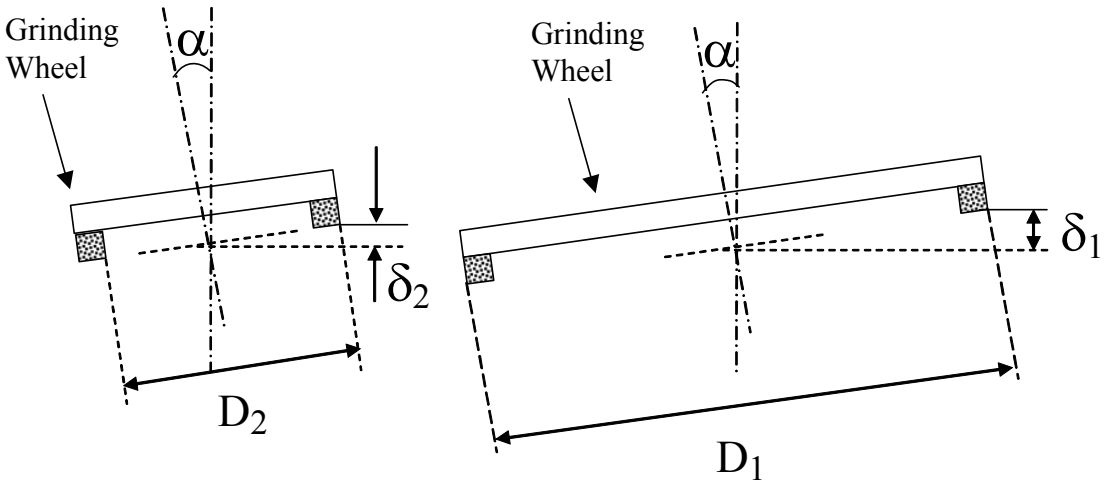
(b) After sintering

Fig. 17. Pore formation in a vitrified-bond wheel (after [28]).



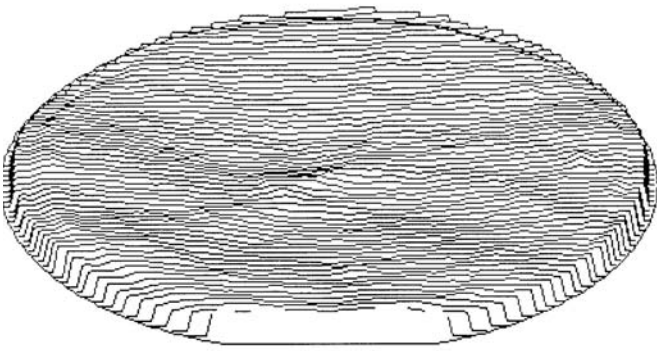
(Nc – rotational speed of chuck,
Ns – rotational speed of wafer)

Fig. 18. Effects of wheel diameter on grinding mark curvature [8].

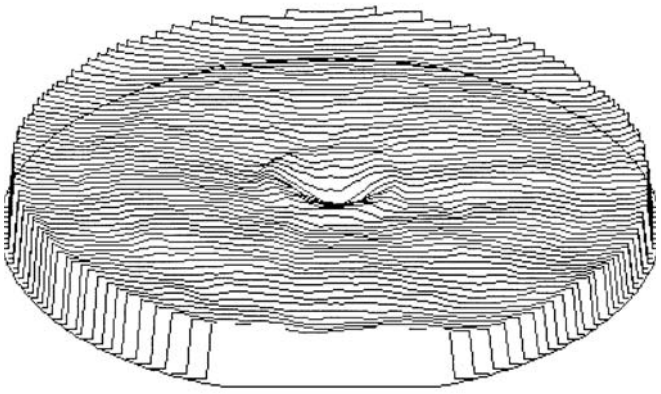


α – tilt motion error δ – depth of grinding marks

Fig. 19. Effects of wheel diameter on grinding mark depth [62].



(a) A ground wafer without central dimple.



(b) A ground wafer with central dimple.

Fig. 20. Illustration of center dimples on ground wafers (after [63]).