Disaggregation and surface modification of nanometer-sized diamond particles as abrasive agents by ultrasound exposure for polishing and texturing of hard disk with high recording density

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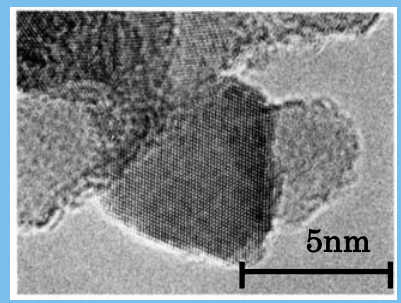
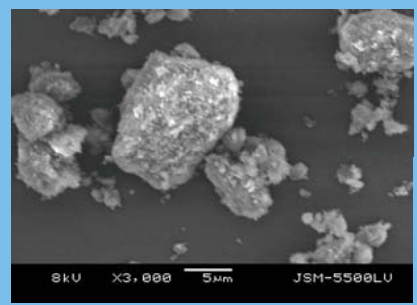


TEM image

Primary particle



SEM image

Aggregated particles

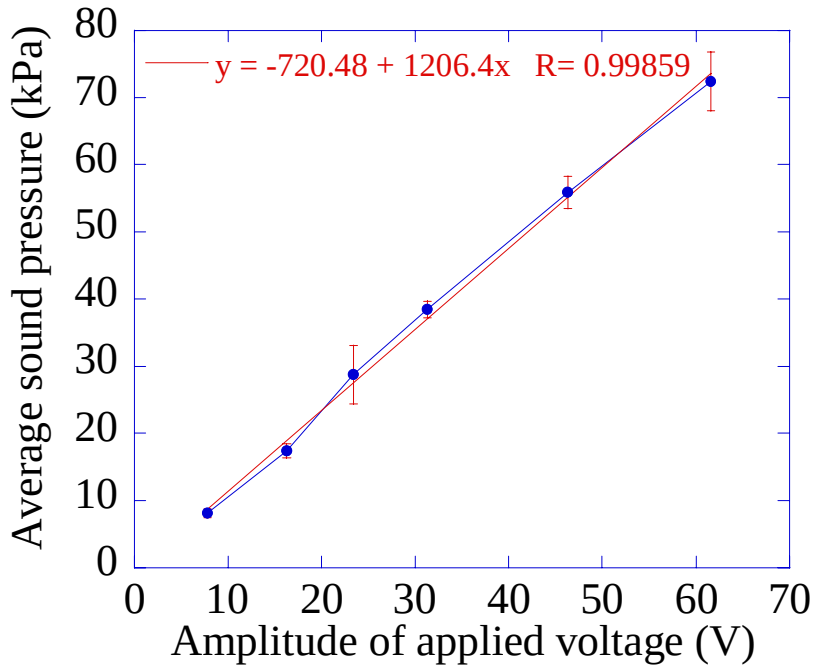
Use of acoustic cavitation by ultrasound irradiation into diamond suspension

① Disaggregation

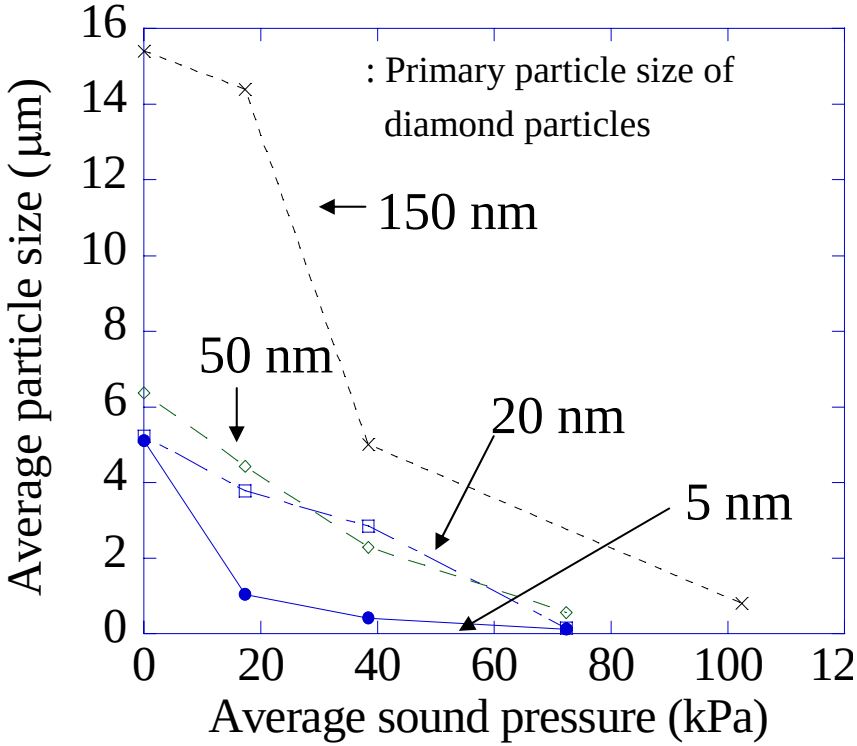
← Shock waves （ Sono-mechanical effect ）

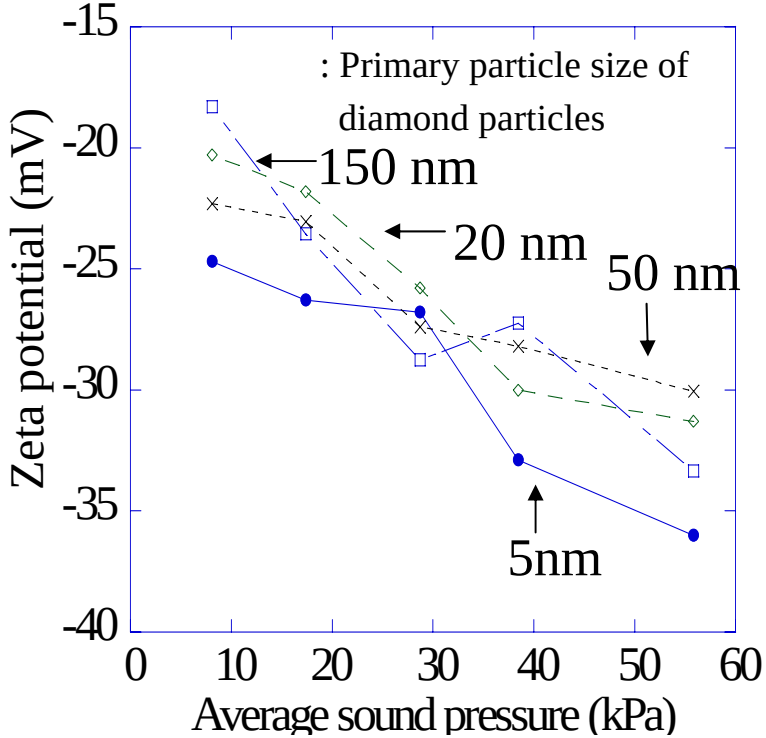
② Avoidance from reaggregation by surface modification

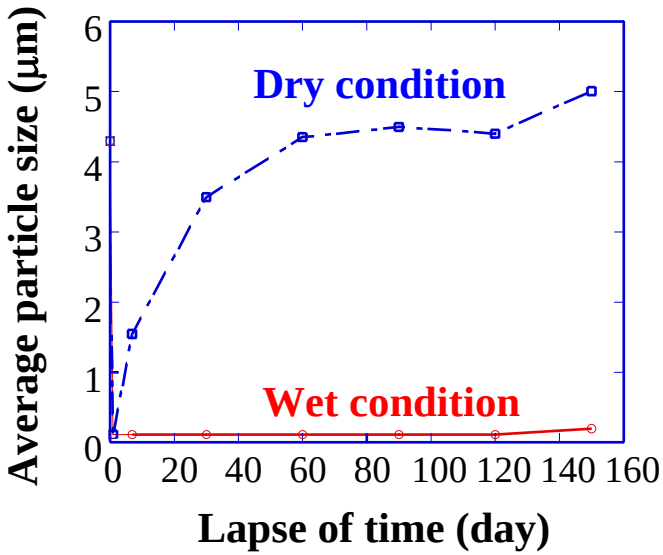
← Active oxygen species （ Sono-chemical effect ）

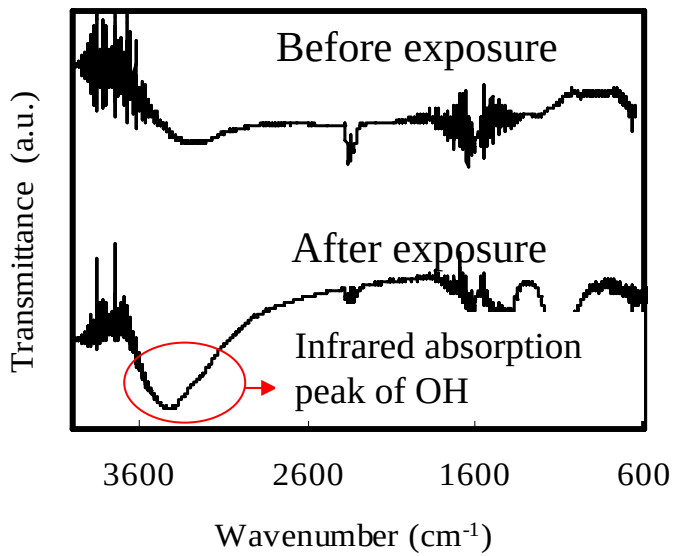


- Waveform : C. W.
- Exposure time : 20 min.
- Operating frequency : 155 kHz
- Distilled water : 500 mL
- Quantity of diamond particle : 30 mg


: Primary particle size of diamond particles
150 nm
50 nm
20 nm
5 nm
Average particle size (μm)
Average sound pressure (kPa)


: Primary particle size of diamond particles
150 nm
20 nm
50 nm
5nm
Zeta potential (mV)
Average sound pressure (kPa)


Dry condition
Wet condition
Average particle size (μm)
Lapse of time (day)


Before exposure
After exposure
Infrared absorption peak of OH
Transmittance (a.u.)
Wavenumber (cm-1)