The effect of high power ultrasound on an aqueous suspension of graphite
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Figure 1: Decrease of the particle size by ultrasonic treatment on graphite powder

![Graph showing the decrease of particle size by ultrasonic treatment]
Figure 2: Particle size vs. energy density

Energy density ($10^5$ J.g$^{-1}$)

Particle size x16, x50, x84 (µm)

- 10 W/cm²
- 20 W/cm²
- 30 W/cm²
Figure 3: HRTEM photographs showing the graphite crystallites before and after ultrasound treatment (with probe A)

Sample not treated

Sample treated at 20 W/cm²

Sample treated at 30 W/cm²
Figure 4: pH and H$_2$O$_2$ curves during graphite sonolysis (powder A, probe A, m = 1 g, V = 1 L, T = 20 °C, Argon saturated, I = 20 W/cm$^2$)

Time (min)

H$_2$O$_2$ consumed: 338 µmol

H$_2$O$_2$ with graphite
H$_2$O$_2$ without graphite

pH with graphite
pH without graphite

0,85 µmol/min
1,58 µmol/min
Figure 5: Mass spectrum in the range [68-102] in APCI+ Fourier Transform mode

eau sonifique HR #10  RT: 0.09  AV: 1  NL: 3.41E6
T: FTMS + p APCI corona Full ms [50.00-214.00]
Figure 6: Scheme of the graphite degradation by ultrasound treatment in water

12.5 mm

Compact
Grains
Cristallites
Fragments

Grafted damaged sheets

Aromatic compounds

10 μm - 1 mm
10 nm - 1 μm
1 Å - 100 nm
a few nm
a few Å

H·
HO·
H·
HO·
H·

Acids,
CO₂

A few nm
A few Å

1 Å - 100 nm