

# Acoustic emission

## IBIS nanoindentation accessories

The IBIS acoustic emission accessory is a small ultrasonic microphone which is embedded in a specimen mount. It is capable of detecting sound waves characteristic of events such as internal fracture and delamination of hard thin films.



The output from the microphone goes into a custom-designed preamplifier filter. The preamplifier converts the microphone signal into voltage pulses. Each pulse represents an acoustic emission event. Such an event may be the occurrence of a crack in the material being tested. When a crack pops in, an ultrasonic sound wave is transmitted through the solid. The acoustic emission sensor element detects this sound wave and registers a count. A counter circuit in the computer interface card records the number of counts as an indentation proceeds. A plot of acoustic emission counts against penetration depth can be useful for determining when, during an indentation test, an event occurred



The AE system comprises a PZT acoustic sensor, a low noise preamplifier, a band pass filter, an amplifier/comparator with discriminator, and a pulse counting system. The band pass filter is 100 kHz to 300 kHz.

### Transducer characteristics:

Sensitivity: 120 dB at resonant frequency  
Resonant frequency: 180 kHz  
Temperature range: -20 to +80 C  
Construction: PZT with built-in FET amplifier 27 db  
Base material: Stainless steel  
Dimensions: 5.5 mm dia, 10 mm high  
Cable: No. 10 UNF with double-shielded low noise cable 500 mm long.

The transducer is mounted inside a standard specimen mount and may be removed for replacement or for high temperature specimen mounting as desired.