The presentation will deal with recent progress in measurement technique and quantitative analysis of quantitative acoustic microscope for biological use, as well as its medical and biological applications.

The sound speed microscope is available to characterize tissues that are sliced and mounted on a slide glass. It evaluates the time difference of reflections from front and rear surfaces of the tissue. As these reflections are overlapped, an analysis is required to separate them. The acoustic impedance microscope can visualize the acoustic impedance of a cross section in touch with a plastic substrate by transmitting an acoustic beam from the rear side of the substrate. This type of microscopy has an advantage that the measurement can be performed in vivo introducing no contamination into the target system.

With a wide frequency range up to 400 MHz, both types of microscopes can observe with a special resolution as fine as cell structure. As the beam is strongly focused and the system includes several interfaces, the response to the pulsed signal is complicated, which brings the difficulty in calibration. In the presentation a precise calibration method for acoustic impedance based on sound field analysis will be explained.

Both sound speed and acoustic impedance can be interpreted into elastic parameters such as bulk modulus and shear modulus. In addition a new trial for finer cell observation will be presented. Some examples of medical and biological applications will be presented as well.

**Keywords**: Ultrasonic microscope, sound speed, acoustic impedance, biological tissue

**Reference**