

## ■Research Brief

# A study of the Standing Wave Indicator for the Ultrasonic Cleaner

Toshiaki Shimizu <sup>1,2</sup>

<sup>1</sup> Tokyo Healthcare University Postgraduate School <sup>2</sup> SAKURA SEIKI Co., Ltd

**Background:** At the ultrasonic cleaner (UC) for reprocessing surgical instruments, generally the aluminium foil test is used in order to detect the ultrasonic energy level and the position of standing wave in cleaning solution of UC. The erosion pattern on the aluminium foil can show the position of standing wave. On the other hand, there is another indicator that can indicate the ultrasonic energy level by providing a visual color change from green to yellow <sup>1)</sup>. This indicator consists of the vials including pH indicator bromothymol blue, water, chloroform and the glass beads <sup>2)</sup>. While the UC is supplying sufficient ultrasonic energy, hydrochloric acid is released from chloroform by a chemical reaction triggered by cavitation, color of pH indicator bromothymol blue is changed from green to yellow <sup>1, 2)</sup>.

Author considered that this mechanism can be applied to fabricate the new type of indicator which enables to locate the position of standing wave in the cleaning solution of UC by visual observation and which can be used in stead of the aluminium foil test.

**Objective:** Creating the standing wave indicator that can show the position of standing wave in the cleaning solution of UC more clearly to be used as an alternative of the aluminium foil test.

**Method:** A standing wave indicator which uses the chemical reaction triggered by cavitation was fabricated as a trial piece. Then the performance test was carried out using a real UC. The structure of the trial piece of standing wave indicator is shown on Figure 1, the placement of a trial piece in UC bath is shown on Figure 2. Precondition of UC is as follows.

Apparatus : Ultrasonic Cleaner YS-20, SAKURA SEIKI Co., Ltd.

Frequency , Power and Volume : 28kHz, 300W, 20L

Processing time : 20 seconds

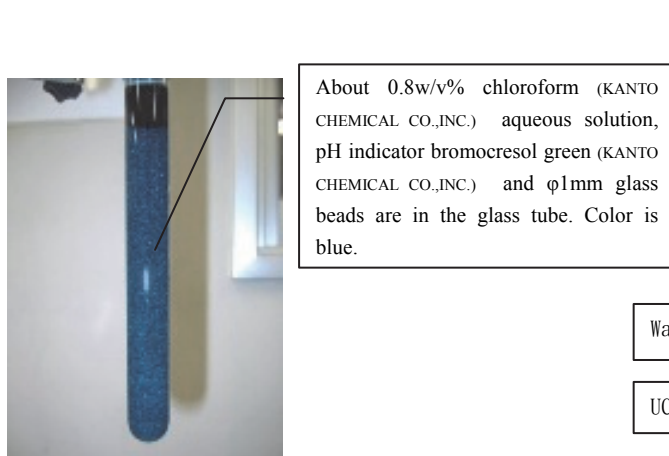


Figure 1. The trial piece of standing wave indicator.

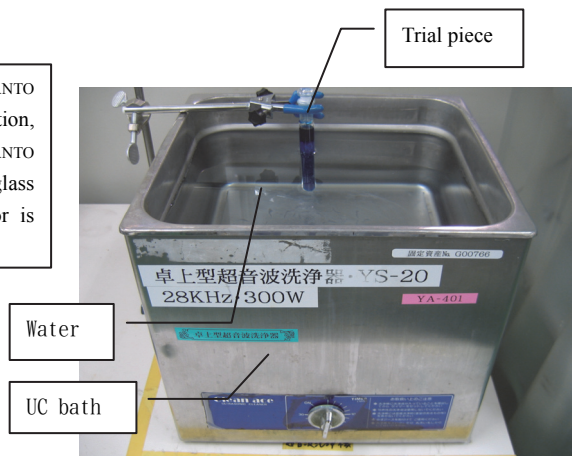


Figure 2. Placement of a trial piece in UC bath.

**Result:** After the performance test conducted with UC, its indicator color changed from blue to yellow at the position where the standing wave was present as shown Figure 3.

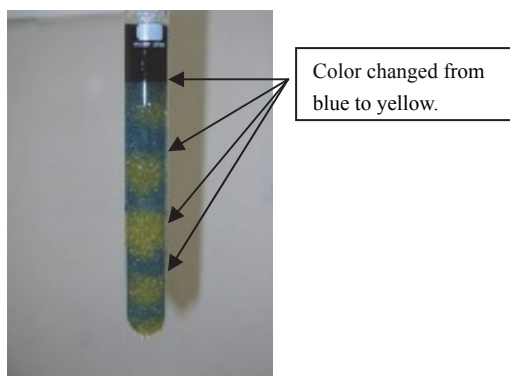


Figure 3. After the performance test.

**Conclusion:** This trial piece of the process indicator was confirmed to be able to detect the position of standing wave in the cleaning solution of UC. Also it was confirmed to be able to used repeatedly about five times. However, performance of this indicator is not sufficient because it is only in a trial basis. Therefore, a further study is necessary to make it adequate for practical use.

#### ■Reference

- 1) Pfeifer M. Validation of SonoCheck for the Monitoring of Ultrasonic Energy of Ultrasonic Cleaner.  
<http://www.healthmark.info/CleaningVerification/SonoCheck/ValidationofSonoCheck.pdf>. accessed November 16, 2014.
- 2) Zwahlen A, Wild MD, Jung C. Comparison of Methods for Testing Ultrasound in the Cleaning Bath: *DAGA 2014 Oldenburg* 716-17.