

## Lamb Wave-Based Blood Coagulation Measurement System Using Citrated Plasma

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**Abstract :** Acoustomicrofluidics has gained much attention due to the advantages, such as noninvasiveness and easy integration with other miniaturized systems, for clinical and biological applications. However, a limitation of acoustomicrofluidics is the complicated and costly fabrication process of electrodes. In this study, we propose a low-cost and lithography-free device using Lamb wave for blood analysis. Using a Lamb wave, calcium ion-removed blood plasma and coagulation reagents can be rapidly mixed for blood coagulation test. Due to the coagulation process, the viscosity of the sample increases and the viscosity change can be monitored by internal acoustic streaming of microparticles suspended in the sample droplet. When the acoustic streaming of particles stops by the viscosity increase is defined as the coagulation time. With the addition of calcium ion at 0-25 mM, the coagulation time was measured and compared with the conventional index for blood coagulation analysis, prothrombin time, which showed highly correlated with the correlation coefficient as 0.94. Therefore, our simple and cost-effective Lamb wave-based blood analysis device has the powerful potential to be utilized in clinical settings.

**Keywords :** acoustomicrofluidics, blood analysis, coagulation, lamb wave

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