

# “PIEZOELECTRIC SENSING OF PHYSICAL PROPERTIES AND COMPONENTS OF BIOLOGIC MATERIALS” VCU #10-070

## Applications

- Determines onset of blood coagulation and clotting characteristics.
- Detects/monitors physiological responses to symptom-management therapies.
- Provides a guide to coagulation and transfusion therapies.

## Advantages

- Potential reagent-less methodology.
- Provides rapid, bedside measurements of biologic fluids in response to therapies.
- Easily miniaturized for first responder settings.
- Highly accurate and reliable measurements.
- Can be joined with existing technologies, such as Redox-potential measurements.
- Does not require dampening of piezoelectric actuator

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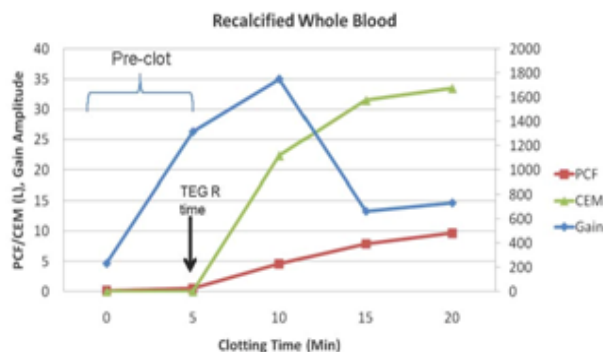
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## Market Need

Extensive insight into an individual's health status can be obtained by detecting and monitoring whole blood coagulation, particularly in relation to inflammatory systems. Accurate and efficient detection of changes in blood properties and its coagulum significantly improves prognostic outcomes for patients. While there are methods, such as thrombelastography (TEG), available to obtain clinical measurements of these properties, they are time consuming, prone to human error, and lack portability. There is considerable need for cost effective, accurate, and portable modalities for detecting and monitoring minute variations blood coagulation.

## Technology Summary

This is a unique method of using piezoelectric systems for detecting and monitoring blood coagulation. The current invention can be employed in multiple configurations (e.g., single actuator/sensor instrument, multiple sensors positioned around a single actuator, etc.). This technology can profile the rheometry and viscoelastic behavior of blood. Demonstrated in the figure below, sensor response (gain amplitude) can be correlated with clotting parameters (e.g., platelet contractile force—PCF, clot elastic modulus—CEM) and the onset of clotting by TEG. The device ultimately can be used to provide clot onset time, rate of clot buildup, clot strength, and clot dissolution as well as response of coagulation to introduced therapies. The technology is envisioned to serve as an alternative to TEG and other methods of monitoring blood coagulation.



## Technology Status

Patent pending: U.S. and foreign rights are available.

Initial testing of the piezoelectric device has been confirmed using various media including whole blood. Further testing using whole blood clotted with thrombin in combination with either saline or a platelet inhibitor also demonstrates that the device is sensitive to platelet function.

This technology is available for licensing to industry for further development and commercialization.