**Thermoreponsive Shear-Thinning Hydrogel (T-STH) Hemostats for Minimally Invasive Treatment of External Hemorrhages**

**Abstract:** Hemorrhage is the leading cause of death following battlefield injuries. Although several hemostats are commercially available, they do not meet all the necessary requirements to stop bleeding in combat injuries. Here, we report the thermoreponsive shear-thinning hydrogels (T-STH) as minimally invasive injectable hemostatic agents. Our T-SH can be easily injected through a syringe and needle and exhibits rapid mechanical recovery. Additionally, it demonstrates temperature-dependent blood coagulation, decreasing blood loss by over 50%, and significantly prevents blood loss in an ex vivo bleeding model at different blood flow rates. More importantly, our T-STH is comparable to a commercially available hemostat, Floseal, in an in vivo rat liver bleeding model. Furthermore, the hemostat is stabilized, our T-STH can be easily removed using a cold saline wash without any rebleeding or leaving any residues.

**Schematic illustration and phase transition**

**In vitro clotting studies**

**Ex vivo bleeding flow model**

**In vivo liver bleeding model**

**Conclusions**

Our T-STHs formed injectable biomaterials that could be easily administered via a syringe, had higher G' values at physiological temperatures, were hemostatic, and compatible with physiological conditions, allowing local hemostasis without any clotting factors, and can be easily removed using a cold saline wash without leaving any residues. This work opens the way for a new class of thermoreponsive hemostats for the treatment of external hemorrhages.

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**Biodegradable and Flexible GeMA Aerogel (FGA)-based Electronic Skin for Wearable Multiplexed Physical-Electrophysiological-Chemical Analysis**

**Abstract:** Mimicking the extensive sensing capabilities in humans via electronic skin (E-Skin) is essential for assessing the effects of daily routines on the physical, physiological, and metabolic response of the human body, all of which require an E-Skin that can withstand harsh environmental conditions. Commercial E-skins built with electronic films lack breathability, skin comfortability, thermal management, environmental friendliness, and anti-inflammation activity, which impedes wearing comfort, limits multiplexed device integration, and creates skin irritation and/or inflammation with long-term use. Herein, we report a breathable, passive-cooling, non-inflammatory, biodegradable, and flexible E-skin based on gelatin methacryloyl (GeMA) aerogel for non-invasive and continuous monitoring of body temperature, skin hydration, and biopotentials via electrophysiological sensors, and of multiple biomarkers (glucose, lactate, and alcohol) via electrochemical sensors.

**Conceptual illustration of FGA-based E-Skin**

**On-body validation of FGA-based E-Skin**

**Biocompatibility of FGA-based E-Skin**

**Conclusions**

We have demonstrated a breathable, passive-cooling, biocompatible, biodegradable, and flexible FGA-based E-skin for non-invasive real-time, and simultaneous monitoring of hybrid chemical-electrophysiological-physical signals. We validated the performance of this aerogel E-Skin by monitoring the ISF glucose, lactate, and alcohol levels from sweat, skin temperature, and electrophysiological ECGs before and after exercise. This work paves the way for a class of multifunctional aerogel-based electronic skin capable of providing informative data regarding human healthcare and lays the foundation for next-generation, patient-centered diagnostic, and therapeutic tools.