Capacitive Sensing of Triglyceride Film Reactions: A Proof-of-Concept Demonstration for Sensing in Simulated Duodenal Contents with Gastrointestinal Targeting Capsule System

Supplemental Figures and Data

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A. Electronics and Capsule Assembly Processes



Figure S1: Assembly process for platform. Steps 1-4 used for sensor characterization of TG-SPAs (TG and SG are interchangeable) with connection of V_{DD} and GND to external power supply, while Steps 5-8 are used for testing complete capsule. At Step 3, conformal coating was cured over a 24-hour period. At Step 5, after connection to Lithium polymer batter (Powerstream), Deep Sleep mode is entered for a 3-hour time period via transmitted signal to allow for curing of adhesion and coating materials at respective steps. After Step 8, capsule electronics enter Active mode to enable capacitance measurements and signal transmission to mobile phone.



B. Characterization of Deposition Strategy and Effect on Triglyceride Film Stability

Figure S2: Deposition strategies for obtaining SG films over sensors: (a) drop-casting and (b) dip-coating of molten SG solution while the substrates were either left at ambient or pre-heated to SG melting temperature for 5 minutes. (c) Resulting thicknesses in films with each deposition strategy and initial SPA temperature (n=3).

C. Effect of Triglyceride Film Composition



Figure S3: Sensor response testing after insertion of SG-SPAs into buffer solution (0.1 M PBS) when SG film composed of either pure stearin or stearin:glycerol (S:G) ratios of 2:1, 1:1, or 1:2. Film most stable, i.e. least response over time, with the 2:1 S:G ratio compared to other compositions.