Smart Packaging Temperature Sensing for Biologistics

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Abstract: We propose a remote, non-invasive, light-weight, reusable, and nearly instantaneous temperature sensing technique that can be incorporated into the design of next generation packaging, and / or added to existing packaging in the form of a “peel and stick” thin film sensor, suitable for Biologistics shipping and industry. The proposed technology will take advantage of the unique thermal response of thermographic phosphors and the physical, chemical, and thermal properties of an inert polymer, to create a unique reusable temperature indicator with an accuracy of as much as 0.05 °C. The Preliminary data presented here demonstrates the feasibility of a µm-thick biocompatible thermal sensor with a temperature operation range that spans cryogenics up to 400 °C. The manufacturing cost of the sensors is estimated to be approximately 1 c (in its current form), potentially making the sensors inexpensive enough to be incorporated into all packaging without the need for return from the client.