

**FREEZE, THAW AND
MICROWAVE DONENESS
NANO-INDIS**

**COMING SOON
NANO-INDICATORS FOR**

FREEZE

THAW

MICROWAVE DONENESS

**NANO-THAW
(NANO-DEFROST)
INDICATORS**

NANO-THAW/DEFROST INDICATORS

- The quality of certain frozen perishables, such as ice creams, frozen foods, blood products and certain pharmaceuticals deteriorate rapidly if they are brought above the freezing temperature (usually zero degree centigrade)
- Hence, there is a need for defrost or thaw indicators
- A number of thaw indicators have been reported in literature. None of the thaw indicators have been successful in the market mainly because they change color too rapidly

NANO-THAW/DEFROST INDICATORS

- When we go for grocery shopping, we pick up a frozen food package, place it in a cart, check out, then place it in the car/trunk and go home to put it in the freezer. The perishable does not lose its quality/freshness during this normal handling or because the surface of the container was above the freezing temperature
- We have developed nano-thaw indicators with a delayed effect for a message (e.g., “THAWED FOR PROLONGED TIME”) to appear. These indicators monitor effect of integral value of time and temperature above the freezing temperature

**NANO-INDICATORS
FOR DONENESS OF
MICROWAVE FOODS**

NANO-INDICATORS FOR DONENESS OF MICROWAVE FOODS

- Microwave ovens don't evenly heat the food (usually frozen). The heating rate as well as individual settings vary for oven to oven. The food inside the container should be uniformly heated and should reach a predetermined temperature
- Hence, there is a need for an indicator to monitor doneness of the microwave foods
- **We have developed self reading nano-indicators which display a message (e.g., "DONE") when food has reached a predetermined exposure to temperature and humidity/steam**

NANO-FREEZE INDICATOR

NANO-FREEZE INDICATOR

- There is a need for monitoring freezing of certain freeze sensitive products, such as fresh blood, certain vaccines, fresh produce and certain chemicals/adhesives to determine if the product has been subjected to a freezing temperature and thus damaged
- Freeze indicators based on the rupture of a capsule containing water/dye and the sucking of color liquids through a capillary are available commercially. This type of devices are large, complex, difficult to manufacture and expensive
- **We have developed nano-freeze indicators which are simple, small and self reading**

**FREEZE, THAW &
MICROWAVE DONENESS
NANO-INDIs WILL BE
POSTED IN FUTURE**

NANO-INDIS™

**A REVOLUTION IN
INDICATOR TECHNOLOGY**

**A PACKAGE OF
SELF-READING INDICATORS
FOR PACKAGING INDUSTRY**

NANO-CONVERSION TECHNOLOGY

AN IGNORED BUT NOVEL AND
UNIQUE FIELD OF NANOSCIENCE

FOR ADDITIONAL INFORMATION CONTACT:

Dr. Gordhan Patel, President

JP LABORATORIES, INC

120 Wood Avenue

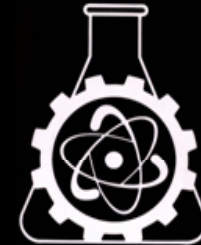
Middlesex, NJ 08846

Phone: 732 469 6670

gnpatel@nanoconvertology.com

www.nanoconvertology.com

www.jplabs.com



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