

EXAMPLE OF  
INDICATOR  
TECHNOLOGY OF  
JP LABS

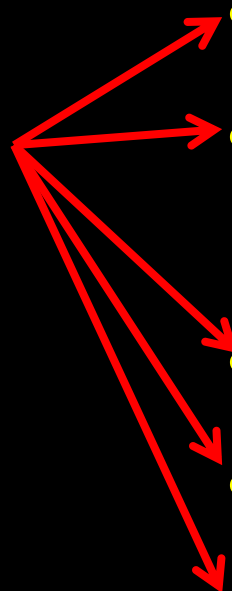
# EXAMPLES OF NANO-INDIS

## DEVICES/PRODUCTS

- Time
- Microwave doneness
- **Time-temperature**
- Thaw
- Humidity
- Radiation (UV, X-ray..)
- Toxic chemicals
- Sterilization
  - Steam, EtO, H<sub>2</sub>O<sub>2</sub>, ...

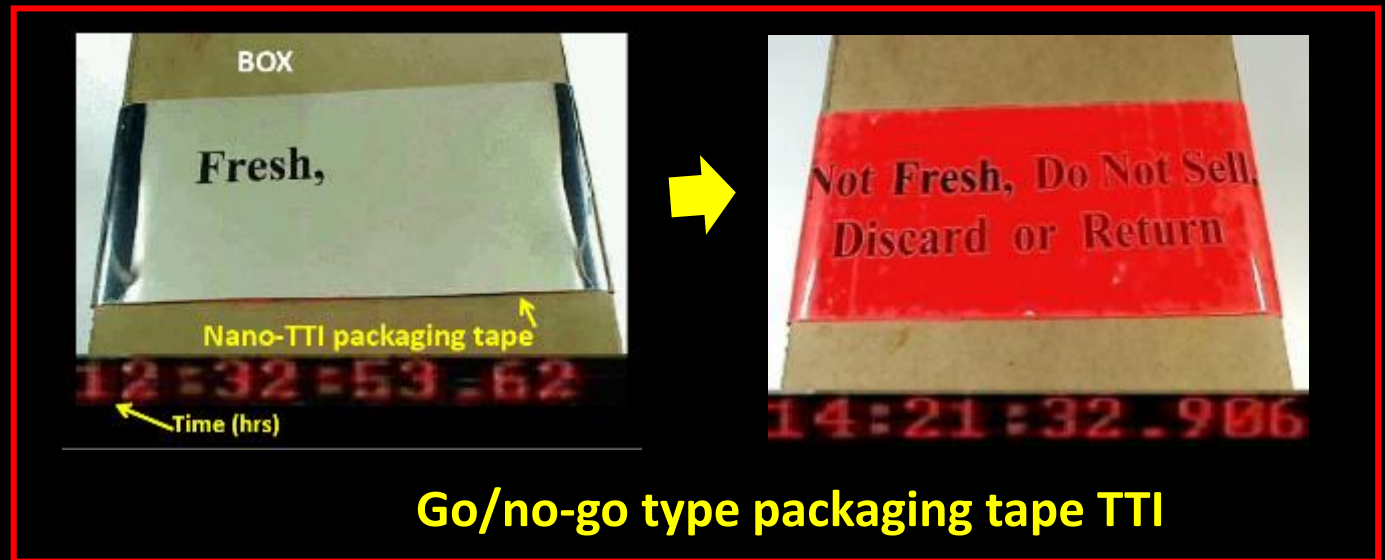
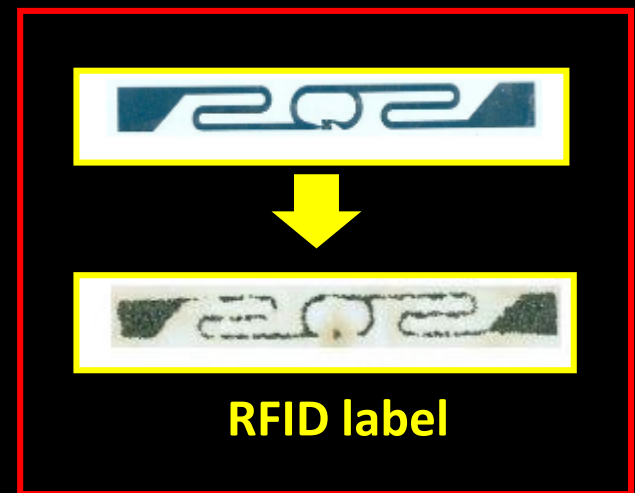
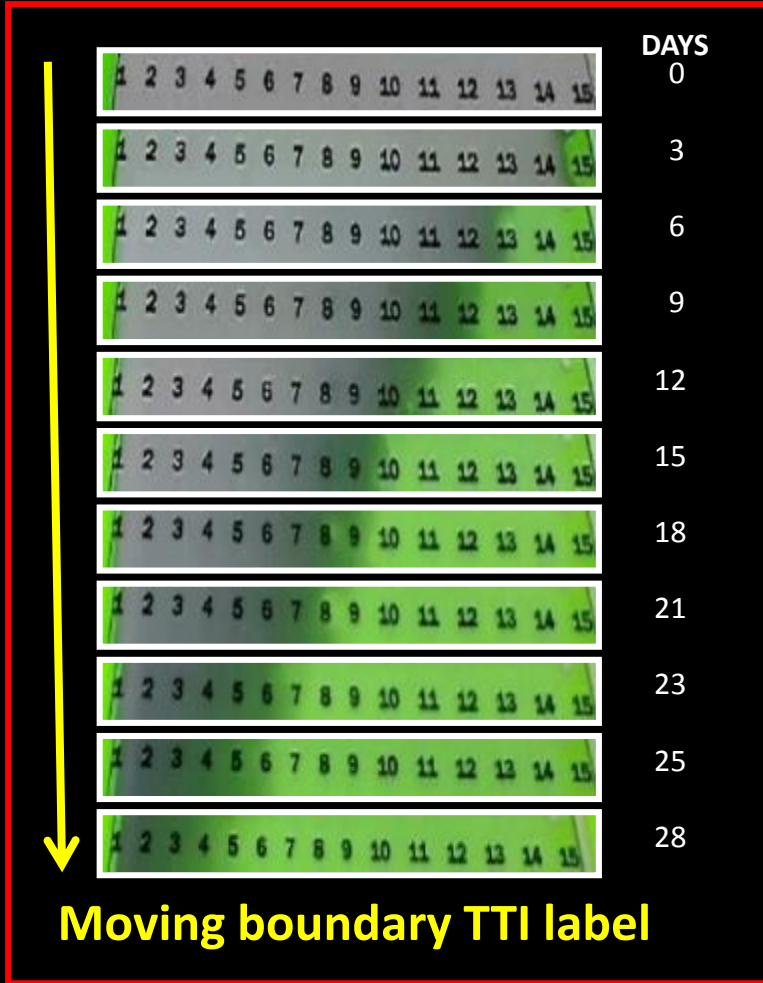
## DESIGNS FOR EACH PRODUCT

- **Small go/no-go labels**
- **Small moving boundary labels**
- **Packaging tape**
- **RFID**
- **High accuracy analytical methods**



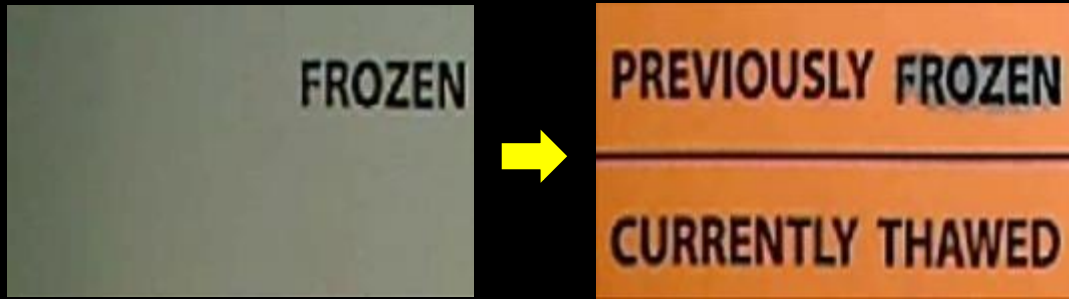
Many of these indicators have designs as shown above and exemplified in the following slide for time temperature indicator (TTI).

# EXAMPLES OF NANO-INDI TTI

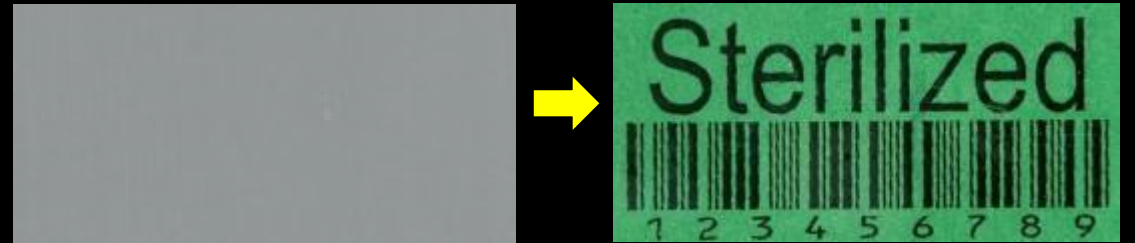


Self-reading Nano-Indis are made from metallized plastic film or metallized ink and a coating/layer of a nontoxic activator and a barrier. Precision coating is required for high accuracy. Commercially available equipment can be used for manufacturing.

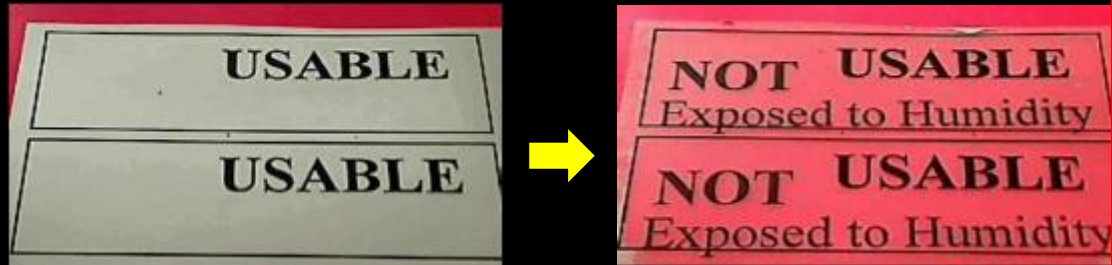
# EXAMPLES OF OTHER SELF-READING NANO-INDI<sub>s</sub>



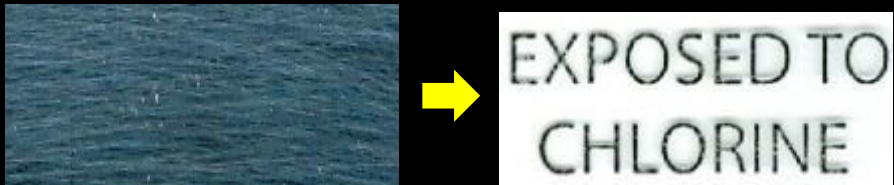
Thaw-TTI indicator



Sterilization indicator



Humidity indicator



Toxic chemical indicator



Self-cancelling visitor's badge

# MAJOR UNIQUENESS OF NANO-INDIS

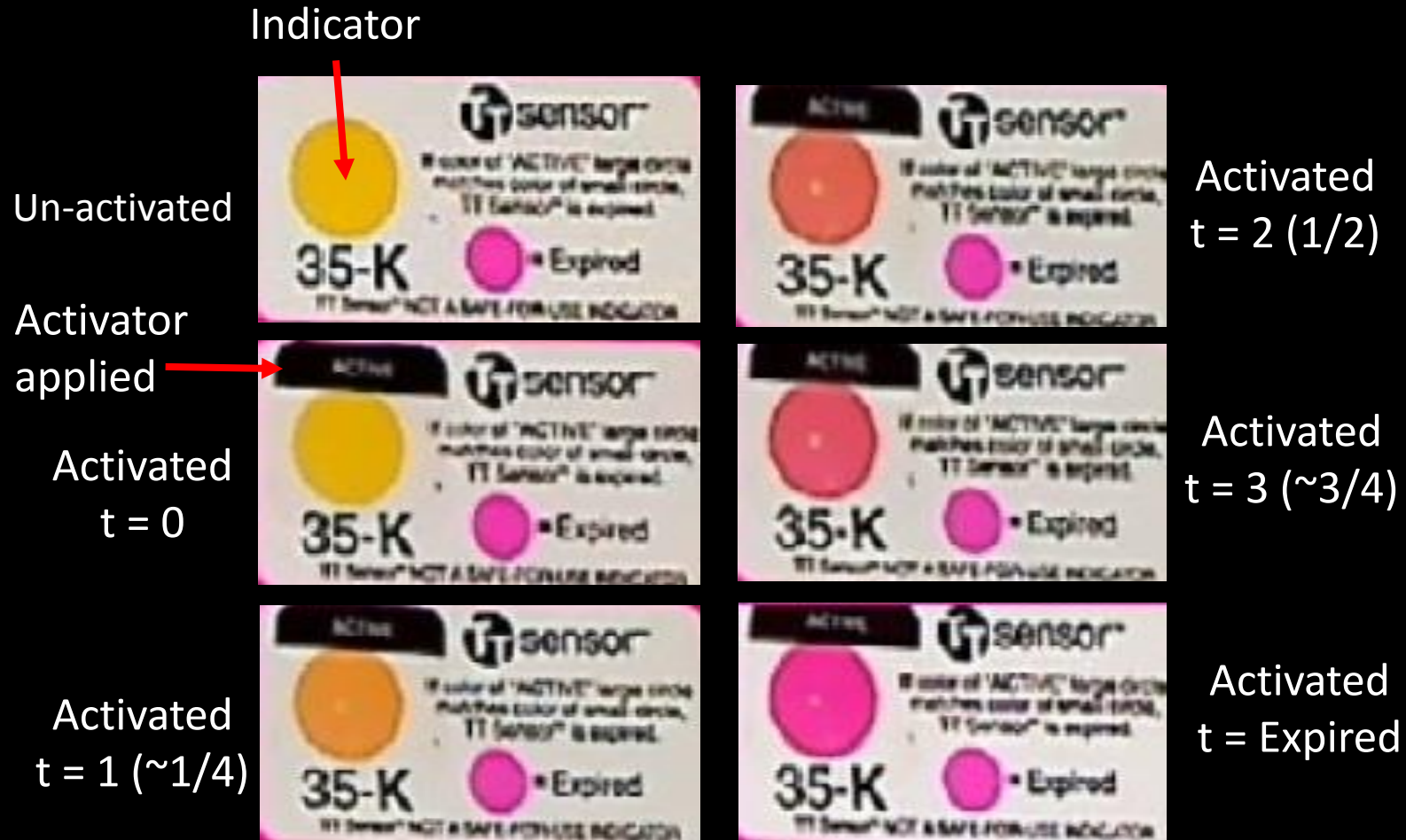
- They can provide any two messages (Go/no-go, with long induction period) in any language, colors and symbols
- They can be manufactured in four major designs such as label, moving boundary, packaging tape and RFID
- A number of indicating devices such as TTI, humidity, sterilization indicators can be made using a metallized plastic film and a coating on it
- A small number of edible or non-toxic materials are used to make a variety of indicating devices
- They have almost all desired properties
- They fill a major technological gap in indicator technology
- They have huge and growing market

# COMPETITION INDICATORS- SUMMARY

- They undergo a gradual color change (color develops or fades)
- None of them are self-reading
- They require color reference chart for interpretation
- They all lack the most desired feature/property, such as a long induction period
- They have no capability of replacing SELL-BY/USE-BY dates
- Many of these also have undesirable effect of ambient conditions such as humidity and UV/sunlight

A FEW OTHER  
EXAMPLES OF  
COLOR CHANGING  
INDICATORS OF JPL

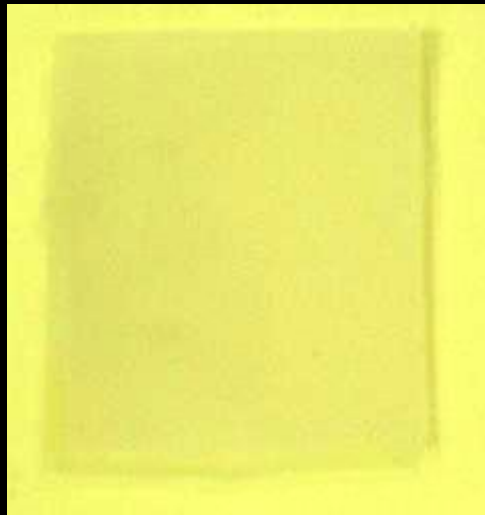
# COLOR CHANGING TTI OF JPL (Two tape TTI)



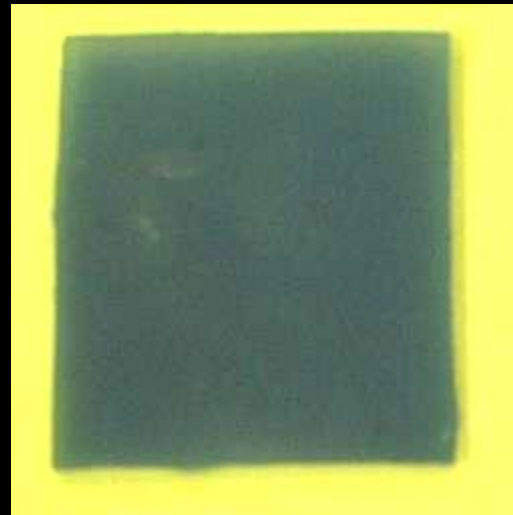
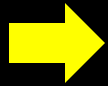
We also have developed many other color changing TTI, humidity, freeze, thaw humidity, sterilization..etc indicators



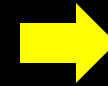
# ACTIVATION AND COLOR CHANGE OF FREEZE INDICATOR



**Unactivated**




**UV Activated**



**Upon Freezing**

# BLOOD RADIATION INDICATOR

**Sensor**



50 Gy      15 Gy  
25 Gy

**SIRAD - BRI**  
radiation monitor

Barcode: 1 25002 74135 0

Date:                      Operator:

Estimated dose delivered:    Gy

To estimate the dose, match the color of the sensor with adjacent color bars. In-between color indicates in-between dose

**Sensor**



50 Gy      15 Gy  
25 Gy

**15 Gy**

**Sensor**



50 Gy      15 Gy  
25 Gy

**25 Gy**

**Sensor**



50 Gy      15 Gy  
25 Gy

**35 Gy**

**Sensor**



50 Gy      15 Gy  
25 Gy

**50 Gy**