EXAMPLE OF INDICATOR TECHNOLOGY OF JP LABS

EXAMPLES OF NANO-INDIs

DEVICES/PRODUCTS

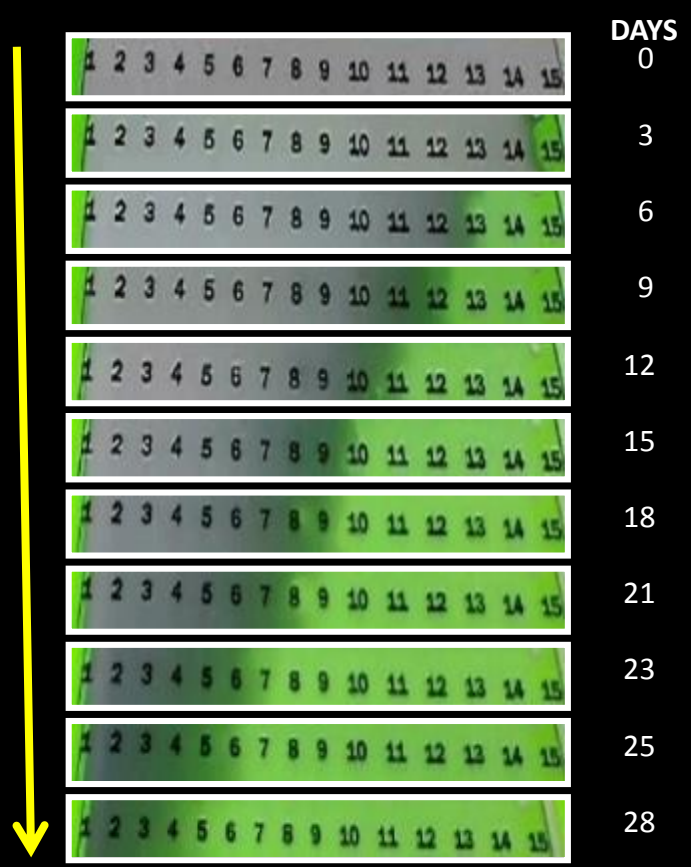
- Time
- Microwave doneness
- Time-temperature
- Thaw
- Humidity
- Radiation (UV, X-ray..)
- Toxic chemicals
- Sterilization
  - Steam, EtO, H_2O_2 , …

DESIGNS FOR EACH PRODUCT

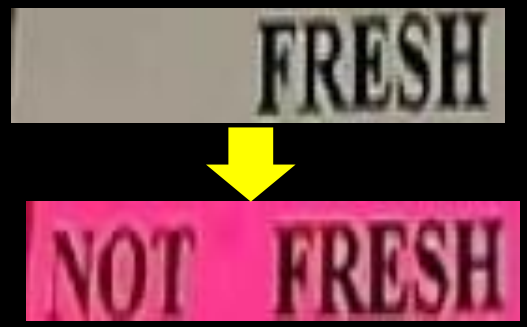
- Small go/no-go labels
- Small moving boundary labels
- Packaging tape
- RFID
- High accuracy analytical methods

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

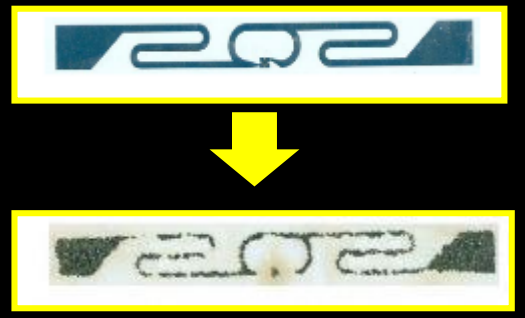
EXAMPLES OF NANO-INDI TTI



Moving boundary TTI label



Go/no-go TTI label

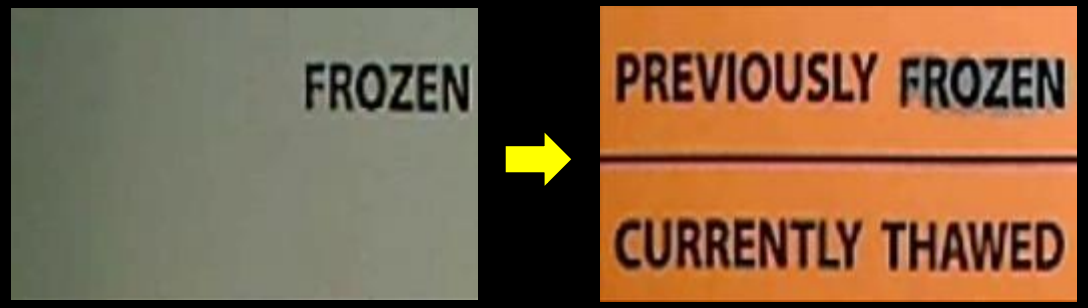


RFID label

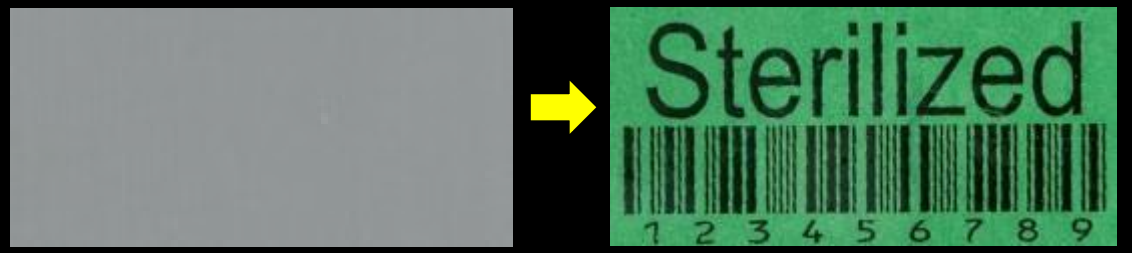
Go/no-go type packaging tape TTI

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.

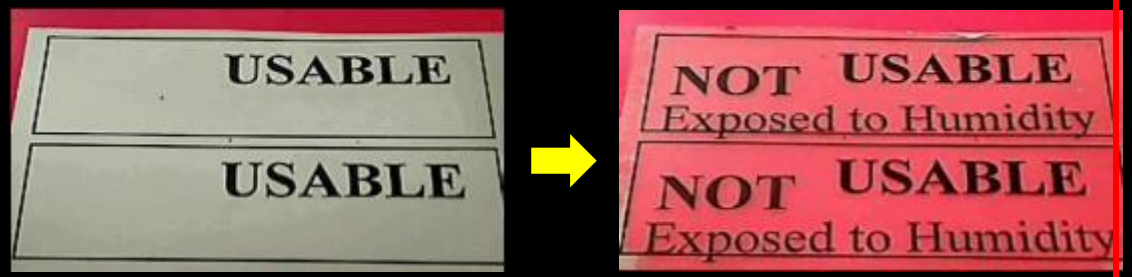
EXAMPLES OF OTHER SELF-READING NANO-INDIs



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 fills a major technological gap in indicator technology
- They have huge and growing market

COMPETITION INDICATORS- SUMMARY

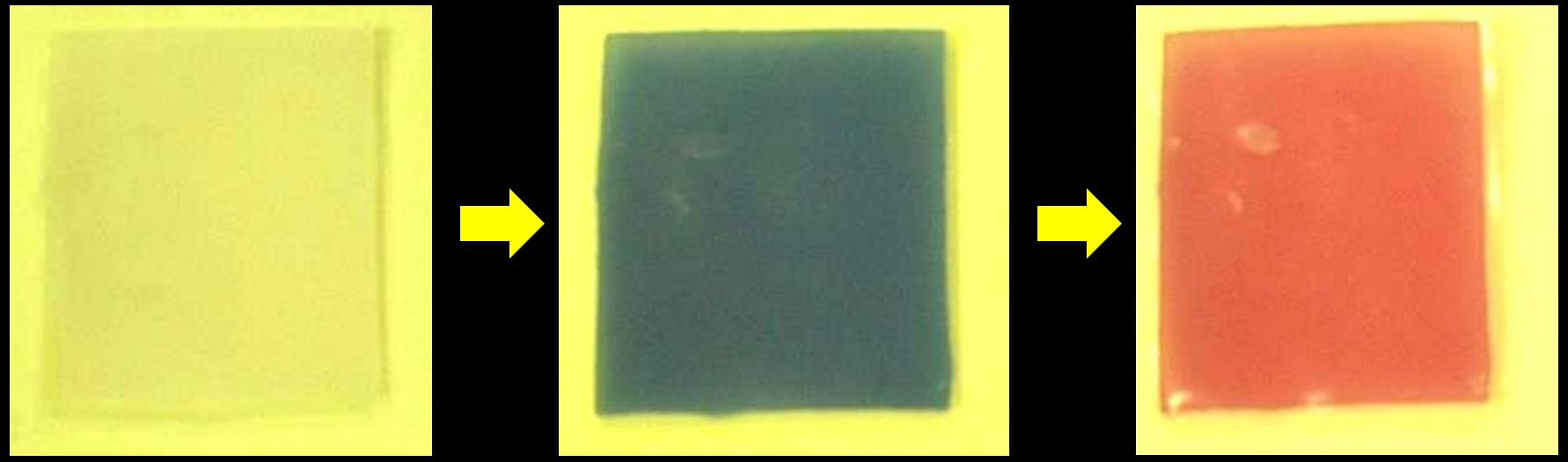
- They under go a gradual color change (color develops or fades)
- None of them are self-reading
- They require color reference chart for interpretation
- They all lack the most desired feature/property, such as a long induction period
- They have no capability of replacing SELL-BY/USE-BY dates
- Many 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