



Antibacterial metallic pigment

# LeafPowder<sup>TM</sup> CuSn

Oct. 2020

# LeafPowder™

2

- Nano & micron size powder

(nanometer : thickness, micrometer : particle size)

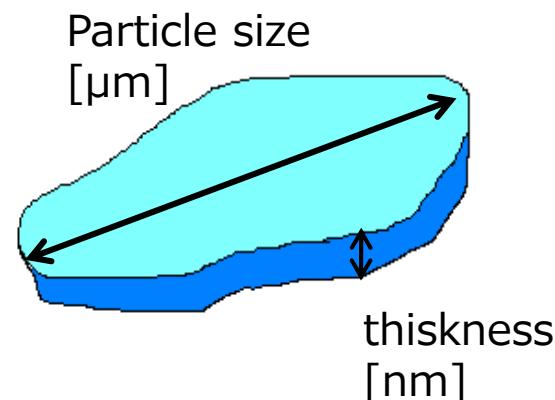
→ expect for balk material function & quantum effect

- High aspect ratio & Scale-like shape

→ thinner & high adhesion

- Flexible selection of materials

→ possible to make various compounds  
by stacking layer technology



All other values are either nominal values or typical (typ.) values, and are not guaranteed

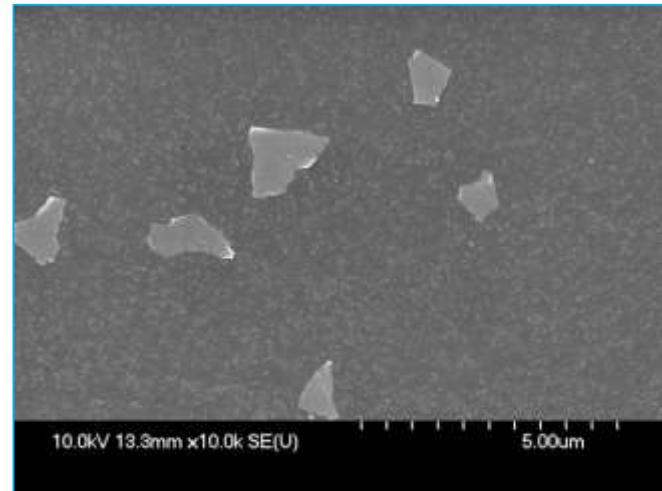
# LeafPowder™ CuSn

high aspect ratio scale-like powder to achieve both metallic image and antibacterial function

- LeafPowder™ CuSn (prototype)
  - ✓ For antibacterial pigment

| Grade  | Contents | Ave. particle size | Dispersion solvent |
|--------|----------|--------------------|--------------------|
| SP3-01 | 10wt%    | 1µm                | Butyl acetate      |

| Typ. value    |               |
|---------------|---------------|
| Ave. size     | 1µm           |
| Thickness     | 20 nm         |
| Solvent       | Butyl acetate |
| Concentration | 10 wt%        |



SEM image of LeafPowder™ CuSn

All other values are either nominal values or typical (typ.) values, and are not guaranteed

# LeafPowder™ CuSn

## ✓ Antibacterial test (shake flask method)

### ◆ Result

| CuSn      | Number of bacteria over time |         |         |         |      |
|-----------|------------------------------|---------|---------|---------|------|
|           | initial                      | 24hrs-1 | 24hrs-2 | 24hrs-3 | Ave. |
| E.coli    | $2.3 \times 10^5$            | <10     | <10     | <10     | <10  |
| St.aureus | $2.2 \times 10^5$            | <10     | <10     | <10     | <10  |

Not detected

| Control   | Number of bacteria over time |                   |                   |                   |                   |
|-----------|------------------------------|-------------------|-------------------|-------------------|-------------------|
|           | initial                      | 24hrs-1           | 24hrs-2           | 24hrs-3           | Ave.              |
| E.coli    | $2.3 \times 10^5$            | $1.2 \times 10^8$ | $1.5 \times 10^8$ | $1.4 \times 10^8$ | $1.4 \times 10^8$ |
| St.aureus | $2.2 \times 10^5$            | $1.3 \times 10^6$ | $1.5 \times 10^6$ | $1.9 \times 10^6$ | $1.6 \times 10^6$ |

\* <10 : not detected

unit : CFU/Sample

## ✓ As additive for antibacterial function

CuSn ink (solvent : binder : CuSn = 60 : 40 : 1) (JIS Z 2801)

| Bacteria  | Number of bacteria over time |                   |                   |                   |                   |                   |
|-----------|------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|           | Sample                       | initial           | 24hrs-1           | 24hrs-2           | 24hrs-3           | Ave.              |
| E.coli    | CuSn ink                     | $1.0 \times 10^5$ | $7.3 \times 10^6$ | $5.1 \times 10^6$ | $7.9 \times 10^6$ | $6.8 \times 10^6$ |
|           | Control                      | $1.0 \times 10^5$ | $1.4 \times 10^7$ | $1.2 \times 10^7$ | $1.6 \times 10^7$ | $1.4 \times 10^7$ |
| St.aureus | CuSn ink                     | $1.1 \times 10^5$ | $8.8 \times 10^2$ | $1.0 \times 10^3$ | $1.0 \times 10^3$ | $9.6 \times 10^2$ |
|           | Control                      | $1.1 \times 10^5$ | $1.4 \times 10^5$ | $1.7 \times 10^5$ | $1.8 \times 10^5$ | $1.6 \times 10^5$ |

Reduce bacterial growth  
by low concentration !

All other values are either nominal values or typical (typ.) values, and are not guaranteed

# LeafPowder™ CuSn

- IJ printed sample by LeafPowder™ CuSn eco. solvent ink



To accommodate metallic and antibacterial