# DKN Research Newsletter

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**(Micro Electronics & Packaging)**
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## Metallization of Non-Conductive Substrates

**The wet plating process is not a new technology. Several relics indicate that humans developed a crude wet plating process more than two thousand years ago. Alchemists upgraded the plating process to change metallic lead to gold. It is indeed possible—all you need is a particle accelerator, a vast supply of energy and an extremely low expectation of how much gold you will end up with. After the Second World War, a physical dry plating process (vacuum evaporation and sputtering) was developed. The wet plating processes could be replaced by the dry physical process, especially in electronics industry; however, the wet plating process remains the popular metallization processes in the 21st Century for electronic components and printed circuit boards.**

**The wet plating processes and the dry physical processes both have advantages and disadvantages. Manufacturing companies select an appropriate plating technology based on each project.**

**Sputtering is a capable process to metallize non-conductive materials, especially with plastic resins. However, the process must be conducted in vacuumed chambers, therefore the sizes of the parts are limited and cost per unit is high. On the other hand, wet electroless plating offers flexible part sizes and shapes, and has the advantage of lower cost and investment, making this process attractive. Small applicability of the process compared with spattering is a disadvantage with electroless plating.**

**There were significant technical progresses with chemicals and surface treatments used in electroless plating over the last decade. Nowadays, plating chemicals provides a secure bond strength with the metallic layer on the inert surface of plastic substrates. Manufacturers discovered that employing several chemical and physical treatments before the chemical plating process is very effective in achieving stable bond strength. The new wet plating process can produce low cost copper laminates with polyimide film substrates by Roll-to-Roll.**

**DKN Research Group reviewed the plating processes using the new chemicals for metallization of plastic materials. We confirmed a stable copper layer with a thin nickel seed layer on the surface of polyimide films. We documented high**

**performances from PET (polyethylene terephthalate), PEN (polyethylene terenaphthalate), Polyolefin resin, PEEK (polyethylethylketon), LCP (liquid crystal polymer), fluorocarbon resins and more. DKN expanded the list of applicable materials; we are eager to conduct chemical metallization on new materials. Feel free to contact us with some with your material challenges for metallization.**

**Correction: Newsletter #1901**

**Line 16, incorrectly used the year 2019, 2017 is the correct year**
**Line 18, incorrectly used 11.91 US dollars, 19.67 billion US$ is correct**

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**Headlines of the week**
**(Please contact haverhill@dknreseach.com for further information and news.)**

1. **Renesas (Major semiconductor manufacture in Japan) 2/24**

**Has developed a new cross domain microprocessor "RH850/U2A" with embedded flash memory as the controller of the automobile equipment.**

2. **Olympus (Major optical device manufacturer inn Japan) 2/25**

**Has commercialized a new soft wear "EndoBRAIN" as the support system for the medical diagnoses process with optical endoscope.**

3. **Toshiba (Major electric & electronics company) 2/26**

**Has developed a new image recognition device with SoC (System on Chip) technologies. Ten times faster for processing, 4 times higher energy efficiency.**

4. **Sharp (Major electronics company in Japan) 2/26**

**Has rolled out a new network monitoring camera "YK-H021A" with embedded microphone for business use.**

5. **Tokyo University (Japan) 2/27**

**Has established the manufacturing process of the high precision mirror of X-rays. The technology is also available for semiconductor equipment.**

**6. Asahi Kasei (Major chemical company in Japan) 2/28**

**Has started a field test of the carbon dioxide concentration monitoring system in the living environment. The system monitors heat distribution in the area.**

**7. Panasonic (Major electronics company in Japan) 2/28**

**Has completed zero-emission manufacturing of carbon dioxide at two plants in Japan and Belgium. Panasonic will expand the activity worldwide.**

**8. Teijin (Major material supplier) 3/4**

**Has developed a high heat resistant carbon fiber prepreg for engines of the jet airplanes. The new material also has very high mechanical strength.**

**9. Tohoku University (Japan) 3/4**

**Has developed a new flexible Hall device introducing thin film magnet of Fe/Sn alloy as the magnetic sensors of the IoT systems.**

**10. Nippon Chemi-Con (Major device supplier in Japan) 3/5**

**Has co-developed a new EDLC device as the high energy density storage capacitor for EV automobiles.**

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