

Material innovation for a bright semiconductor future

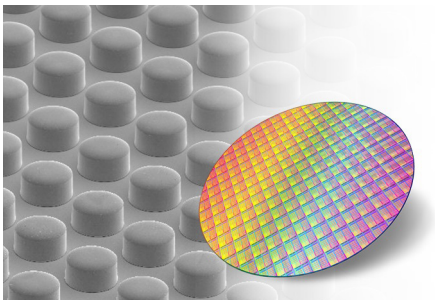
Technology manufacturers need a steady supply of the right chemicals to create the next generation of innovations and devices. Here's how that happens.



"Being first is important. There is a long history in our company of being innovators in our industry. We try our best to be the fastest to respond to current industry trends and stay ahead of our competitors the same way we have in the past."

Yasuyuki Sakai,
President, Ishihara Chemical Co., Ltd.

The chemical industry is at the very heart of just about every manufacturing and production business, and that's especially true in Japan. Without semiconductors, special plating and processed metals there would simply be no modern tech or ma-

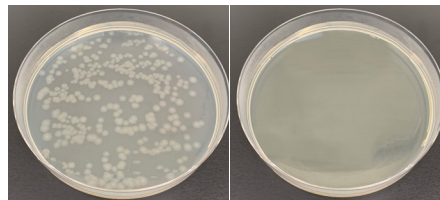


Cu (Copper) pillar bump for wafer



Chip component with Sn (Tin) plating

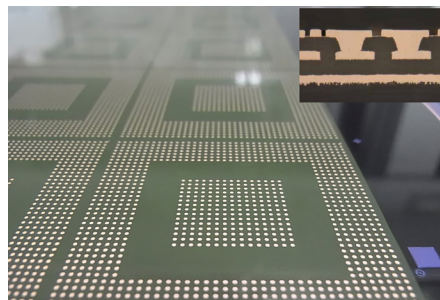
nufacturing industry. The Japanese sector has always been at the cutting edge of innovative chemicals, but for firms leading the charge, it's not enough to think about existing markets and today's success – it's about meeting tomorrow's needs today. Ishihara Chemical has been an industry leader for more than a century and even though it already has a wide range of products, it is always working to expand its horizons through innovation. With the firm having started in medical chemicals and expanding into a huge range of products



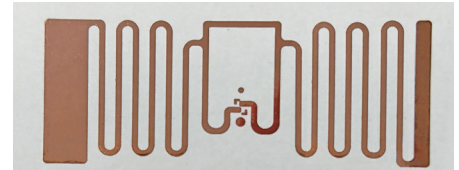
Blank sample: Colonies of bacterium coli. **Copper nano anti-bacterial sample:** No colony was observed.

from car wax to plating chemicals for semiconductors, president Yasuyuki Sakai is proud of that diversity and its importance to the industry. He said: "We have four businesses across three different fields. We call this 'all-weather business performance', meaning that if one industry is having a hard time, it can be supported by the others. We also have strong relationships with global companies exchanging ideas and we work with them to predict what the industry will look like in the future."

One area of particular interest is in production of all-important semiconductors. Japan once dominated half the



Package substrate with Cu (Copper) build up plating



RF-Tag fabricated by flexographic printing on paper with Cu nano-ink and photo-sintering.

global market – Ishihara enjoying 80% of the specific plating chemical supply – but, despite increasing competition from rivals like Taiwan, China and USA, Ishihara's business has remained strong.

They are also strongly committed to Sustainable Development Goals and take green issues seriously, with their plating processes for semiconductors industry-leading and future facing. Other key Ishihara innovations include conductive copper nano-inks, which are used to print electronic circuit patterns, an automated chemical analyzer which monitors chemical conditions vital to produce products



Automated chemical analyzer

such as smartphones, and a unique functional plastic and coating material, including copper nano-powder, that prevents the spread of bacteria. R&D is important – but speed is king. It's crucial to be the best, first. Ishihara is renowned for creating the first car wax in Japan, the first tin plating for semiconductors, replacing more toxic cadmium, and similarly, the first to develop a tin-bismuth alloy plating chemical for Pb-free soldering. Mr. Sakai added: "Being first to market has been quite important to our company's growth. There is a long history in our company of being innovators in our industry."

