

## Image-domain Material Decomposition in Spectral CT with Photon-counting Detectors

*Saturday, 18 November 2023 12:00 (15 minutes)*

In recent years, the concern over the insecure supply of minor metals such as tantalum in Japan has prompted recycling from waste materials such as printed circuit boards. Techniques have been developed to strip metal parts from printed circuit boards, but it is difficult to completely separate parts containing a wide variety of metals, and some loss is incurred. Therefore, we propose a method to detect minute rare metals on printed circuit boards by material discrimination using X-ray CT with a photon-counting detector. For the actual measurement, the Monte Carlo simulator PHITS3.33 was used to simulate the attenuation of X-rays due to the metallic thin film. Simulations were performed by placing 0.1- $\mu\text{m}$ -thick gold and 4- $\mu\text{m}$ -thick gold and nickel on a copper plate and calculating the behavior of the photons when irradiated with X-rays. Simulation results confirmed the attenuation of X-rays by gold and nickel, indicating that imaging is feasible. However, many issues were found in the resolution, imaging time, and other aspects of practical application.

### Topics

Session C. Applied optics and engineering

**Primary author:** HAYASHI, Kohei (Shizuoka University)

**Co-authors:** KASE, Hiroki; NISIZAWA, Junichi; TAKAGI, Katsuyuki; Prof. AOKI, Toru

**Presenter:** HAYASHI, Kohei (Shizuoka University)

**Session Classification:** Session at Shizuoka University