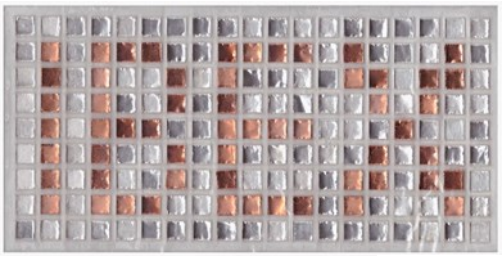
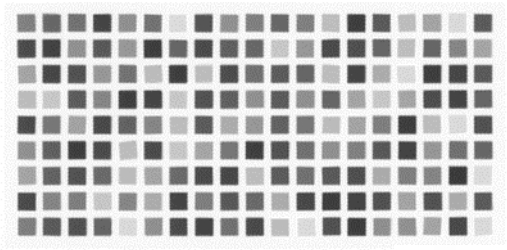
CASE STUDY:

MATERIALS CLASSIFICATION – TEST MOSAIC

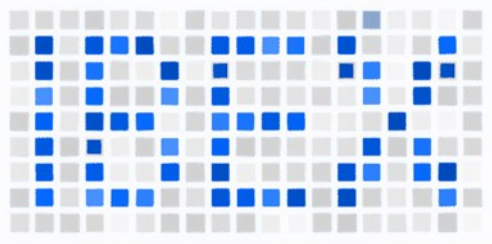


Test mosaic made of copper and silver tiles of different thicknesses, in a plastic grid.

Classic X-ray absorption imaging leads to a random distribution of grey-scale in the image.



IBEX technology recovers energy- and material -dependent absorption information, allowing reconstruction of an image distinguishing materials (different colours in the image) and their thicknesses (local intensity).



Absorption contrast is not enough

Classic X-ray imaging uses differences in net absorption through a sample to generate contrast in an image. However, since the local X-ray absorption is determined by a combination of material type and thickness, the method cannot accurately classify structures where both vary.

Test mosaic

A test mosaic of 8 mm × 8 mm copper and silver squares with thicknesses between 12.5 µm and 600 µm set in a plastic grid on an aluminium backing sheet was made. The X-ray absorption image shows a random array of grey-scale tiles (middle image above). Independent material and thickness information is lost.

IBEX technology recovers material information

A patented IBEX MAP (multi-absorption plate) was placed in front of a standard silicon flat-panel X-ray detector. The MAP modulates the image locally over a few detector pixels in a predictable manner.

The analysis system was then trained on separate samples with a representative range of thicknesses of Cu, Ag and plastic. This generated a database in materials space which exploits the energy-dependence of X-ray absorption with material type.

The image of the mosaic was tested against the database, and each group of pixels was assigned the material which matched most closely. Once the materials had been identified, combination with the original image data gave a measure of the local material thickness.

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