

AbstractID: 8969 Title: Synchrotron Radiation Imaging Showed Cracking-Like Structures in ACR-Approved Mammography Phantoms

Our study using synchrotron radiation (SR) imaging with refraction-enhancement mode showed undesirable structures within the matrix of some mammographic phantoms. Examined were 8 phantoms approved by the American College of Radiology (ACR); 5 from Gammex RMI (US) and 3 from CIRS (US). SR imaging was performed at a synchrotron radiation facility, SPring-8, in Japan using a monochromatic X-ray of 20 keV, and a CCD camera with a resolution of 6  $\mu\text{m}$ . Cracking-like structures, which could not be detected in conventional radiographs, were clearly shown in SR images in 5 of 5 Gammex products, and no in CIRS ones. Most of those structures run circularly around calcification specks. They were categorized to 3 groups; a semi-circular type (A), single circular type (B), and circular type with multiple concentric and radial lines (C). Six of type -As, 5 of Bs, and 4 of Cs were found, totally in 10% of specks. Structures of types A and B do not have effects on the visibility of the specks. It was confirmed, however, that type C cracking degrades the visibility of the specks in radiographs. In one case, contrast was reduced by 60 % comparing with other 3 well-visible specks in the same group. This study shows that some of the mammography phantoms used in quality accreditation programs have structural problems which are latent in conventional radiographs, but which might degrade visibility of the specks in radiographs obtained for quality control, depending on the structural deformation.