

Fabrication of two-dimensional x-ray anti-scatter grids for mammography

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ABSTRACT

Anti-scatter grids are used in mammography to improve the contrast and signal-to-noise ratio by minimizing scattered x-rays. Most commercially available mammographic anti-scatter grids are one-dimensional, focused arrays of lead lamellae, sandwiched between more x-ray transparent spacer materials such as fiber or wood. Two-dimensional (2D), air-core, focused, anti-scatter grids are expected to be able to significantly reduce scatter-to-primary ratio and increase primary transmission in mammography.

Two prototype unfocused, 2D, air-core nickel (Ni) anti-scatter grids were fabricated. The fabrication method uses x-ray lithography and electroplating, LIGA, which allows the fabrication of high aspect ratio metal parts. The metal parts are released from substrate. The grids have 20 μm thick walls and 300 μm period. This geometry permits 87.1% transmission of primary radiation. Each layer of the grid is assembled from nine smaller grid pieces. The assembly technique allows construction of larger grids. Grids of a desired grid height are obtained by stacking the appropriate number of layers, each layer approximately 250-350 μm thick. The first prototype is 1.48 cm x 1.48 cm and 2.00 mm high and the second prototype is 1.32 cm x 1.44 cm and 1.78 mm high. Electroplating with lead/tin will also be reported.

Keywords: LIGA, mammography, anti-scatter grids, Bucky grids