Use of Printed Activation Foil Arrays for Determination of High-Resolution Spatial Distribution of Neutron Flux

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Since the activation foil and threshold detector arrays for evaluating the spatial distributions of neutron flux and energy, respectively, have traditionally been manufactured by hand, it was difficult to achieve the precise array density. In this study, a dense foil array with a precision of ≤ 6 μm was successfully fabricated by using a jet dispenser and printing device to arrange 484 Ag foils in an area of 64 cm², and it was demonstrated that it is possible to detemine high-resolution neutron distribution.

I. INTRODUCTION

To determine neutron flux, the foil activation technique has been widely used [1]. This method involves easily activated materials and measurement of their radioactivity. When small activation foils such as Au foil are densely arranged, 2D distributions of neutron flux can be analyzed [2]. A 2D array of activation foils, which is usually arranged manually, commonly requires time-consuming process that involves punching, weighting and mounting in order to achieve dense and precise arrays. To solve this problem, a quantitative array of activation foils was fabricated via a printing technique based on electrode array technology used by semiconductor manufactures [3]. In this paper, the methods of 2D array printing of a single-element foil and its measurement results of neutron distribution are described.

I.A. METHOD

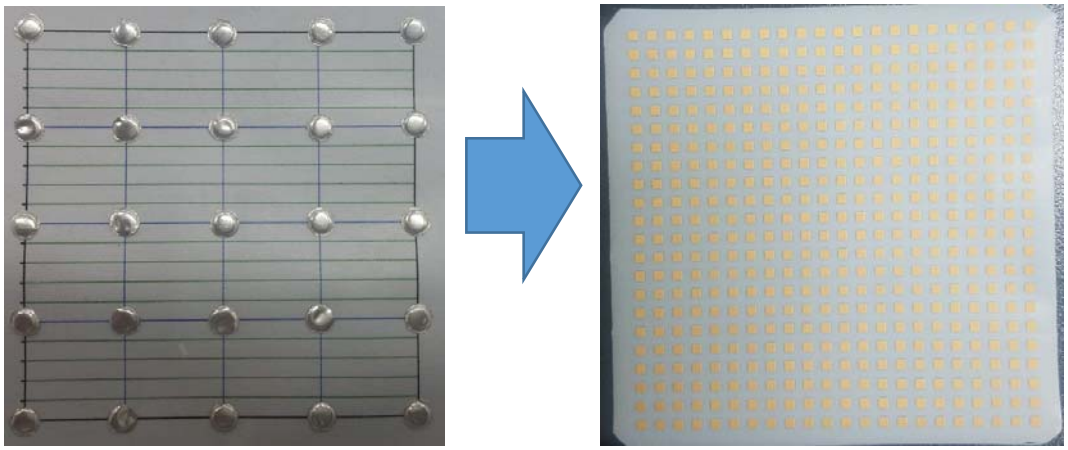

Fig. 1 activation foil array (left: cutted foils, right: printed foils)

Figure 1 shows a change of activation foil array, in printed foil array, 484 foils were arranged in an area of 64cm^2, and the cutted foil array has 25 foils in 16cm^2. Cutted foil where it is an existing method it will substitute and when using printed foil where it is dense, the reporter to confirm the effect which occurs it did.

II. CONCLUSIONS

It was demonstrated that it is possible to detemine high-resolution neutron distribution.

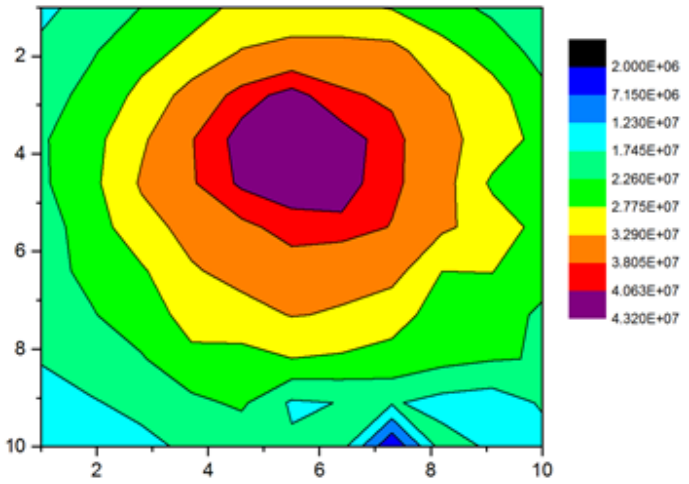

Fig. 2 high-resolution neutron spatial distribution from MC-50 cyclotron

Figure 2 shows high-resolution neutron spatial distribution from MC-50 cyclotron

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