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NOVEL TECHNIQUE OF MAKING THIN TARGET FOIL OF HIGH DENSITY MATERIAL VIA ROLLING METHOD

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In nuclear physics experiments, thin (1-10 mg/cm2) self-supporting foils are required either as a target or as a backing for real target. The rolling method of making such thin self-supporting foils is cost effective and yields more mechanically strong foil than obtained with any other available technique. The targets made by rolling method, due to their crystalline structure are stronger in nature and therefore have better prospects of withstanding in a high energy heavy-ion induced reaction experiments than the targets prepared by vacuum evaporation. The conventional rolling method fails to yield good quality thin foils of thicknesses less than ~ 2 mg/cm2 for high density materials with Z ⊠ 70 (e.g. gold, lead). To prepare foils thinner than ~ 2 mg/cm2 for these high density materials some extraordinary efforts with improved technique are needed. In the present work one such novel technique has been described. Using this technique thin self-supporting gold foils of thickness in the range of 0.850 - 2.5 mg/cm2 were obtained in the present work. The technique uses some novel methods like heating of rolling pack to a temperature of ~ 5000 C to maintain flatness of the pack during rolling, the use of alcohol drops during rolling and the use of butter paper. Prior to this work many people used various techniques to produce thin foils of high density material like W, Tl, etc.[1-2], but none of them could achieve thickness < 2 mg/cm2. This is the first time when a target foil of thickness ~ 1.0 mg/cm2 of a high density material like Gold have been made via rolling method using a novel technique. The details of the technique used will be elaborated during presentation.

[1] Frank J. Karasek, et al., Nuclear Instruments and Methods in Physics Research Section A 167 (1979) 165-166.
[5] J. Gehlot, et al., Proceedings of DAE Symposium of Nuclear Physics, Vo. 58, G44 (2013)

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