ABSTRACT

The dimensions of nanoobjects are important because the properties of nanoobjects are related to dimension and automatic manufacturing inspection of nanoobject requires dimensional information. The current approaches to estimate the projection lengths (one of the important dimensions of nanorods) are manual, error leading and time consuming. So, an automated approach is essential to determine the projection lengths. We propose an innovative approach to estimate projection lengths of nanorods from scanning electron micrographs. Extracting projection length is very crucial to dimensional quality engineering because once we have projection length, we can determine actual length of each nanorod and establish a proper measurement system. The large volume of production of nanorods depends on proper manufacturing process of nanorod which is challenging until there is any proper measurement process exists to understand the manufacturing process of nanorod.

Our proposed automated algorithm can extract nanorods by following steps: consider an image of nanorod, determine top edges and side edges of each nanorod separately, associate edges to corresponding nanorods, extract correct nanorods. The we estimate the projection lengths. The low signal to noise ratio and high degree of overlaps of nanorods in scanning electron micrographs are the major challenges in this research task.

Currently there is no image processing algorithm that can measure the dimensions of nanorods from scanning electron micrograph. Hence our research work will contribute to this area. We calculate the total number of true and false detections of nanorods obtained by our automated algorithm. We compare the algorithm with other relevant algorithms (e.g. Normalized cut, Snake and simagis). This research work is promising to dimensional quality control as it can contribute to establish a proper measurement system of nanomanufacturing.