CONSERVATION OF HISTORICAL DOCUMENTS WITH SILVER SUPPORTED CHITOSAN NANOFIBERS

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ABSTRACT

The main aim of this study to establish conservation method for historical documents from different centuries by using silver dopped chitosan nanofibers. Silver nano particles prepared solvothermal treatment in different morphologies. Chitosan based nanofibers will be tried to fabricate with electrospinning method.

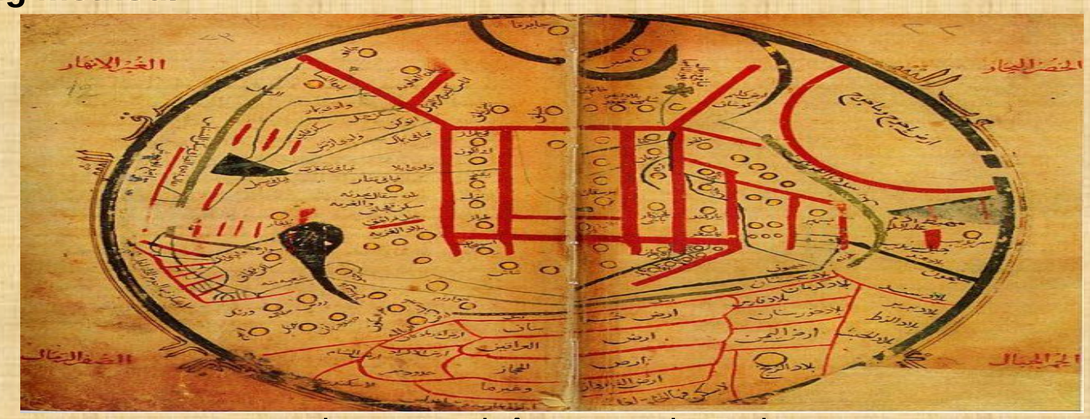


Figure 1- Divânu Lugati't-Turk

INTRODUCTION

Electrospinning is a promising technique for producing continuous polymeric fibers with diameters down to nanometer scale. In electrospinning by using the action of an external electric field imposed on a polymer solution or melt, polymeric based nanofibres such as polyvinyl alcohol (PVA) and polyvinylidene fluoride (PVDF) could be manufactured. It is well known that silver nanoparticles and chitosan, a polysaccharide biopolymer derived from naturally occuring chitin, possess antibacterial properties.

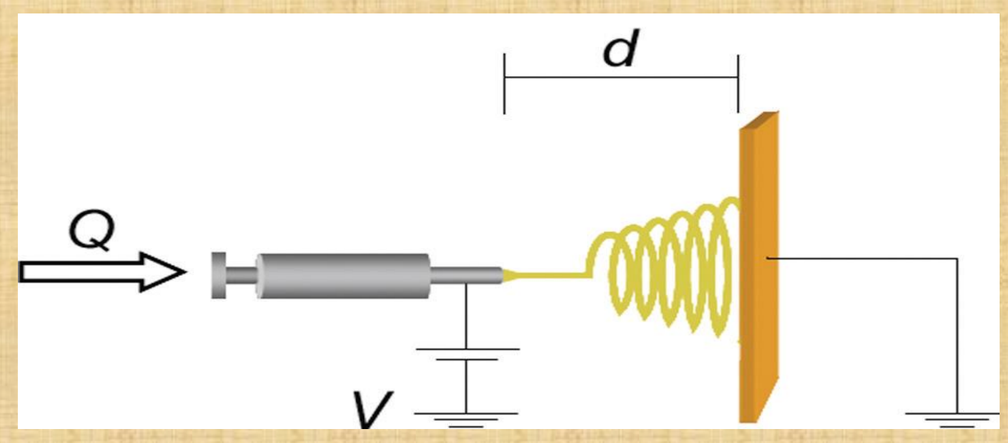


Figure 2- Electrospinning setup

MATERIAL AND METHOD

Initially, silver nano particles that have different morphologies, as wire, geometric, spherical, produced using solvothermal process. Afterwards silver nano particles mixed in chitosan solutions. At final part of experimentals silver dopped chitosan solutions applied in different parameters as voltage, time, viscocity on paper using electrospinning method.

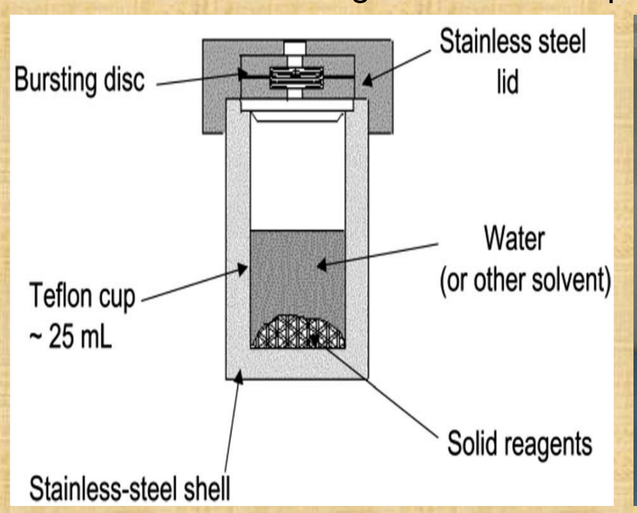
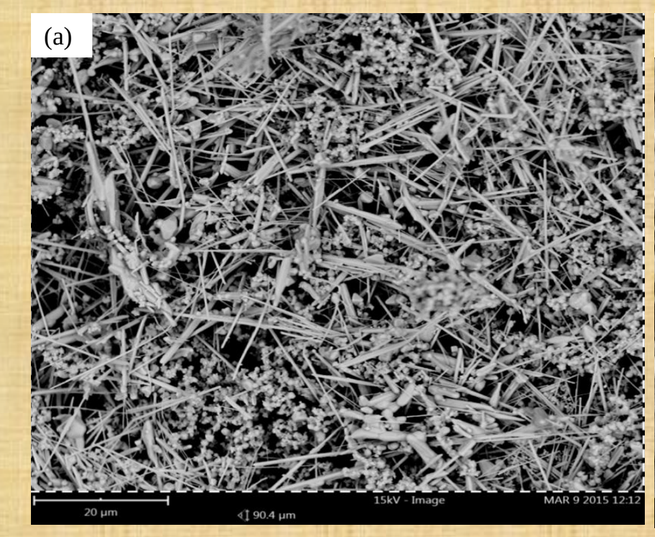
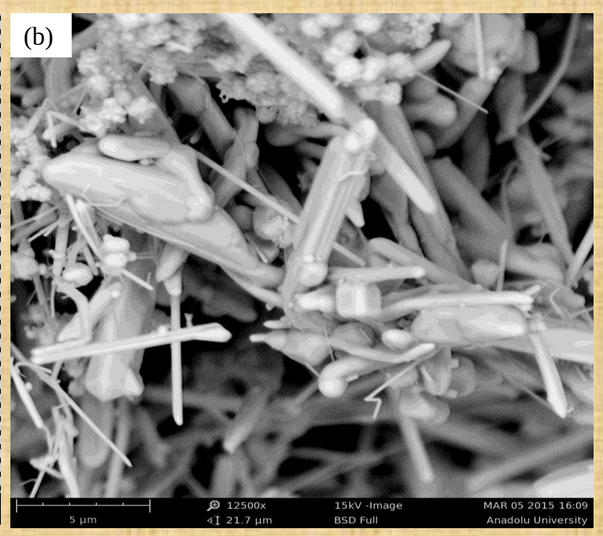


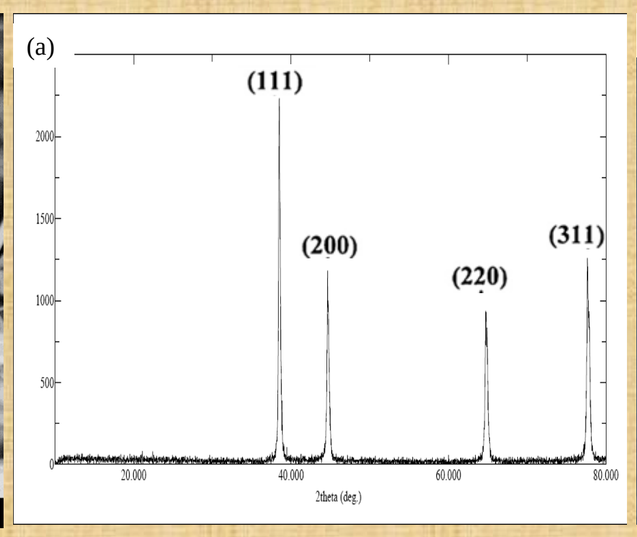
Figure 3- Solvothermal process

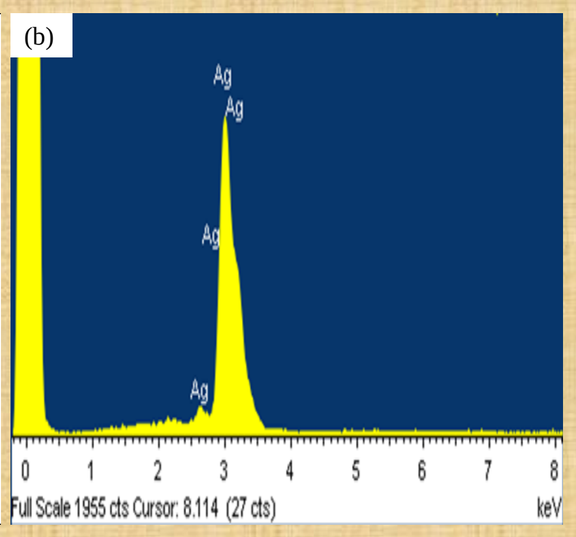
Figure 4- An image of Electrospinning Process in experimentals

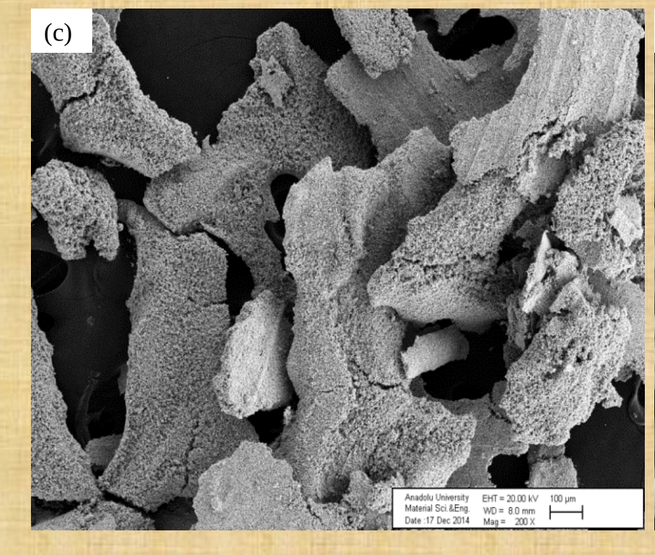
RESULTS

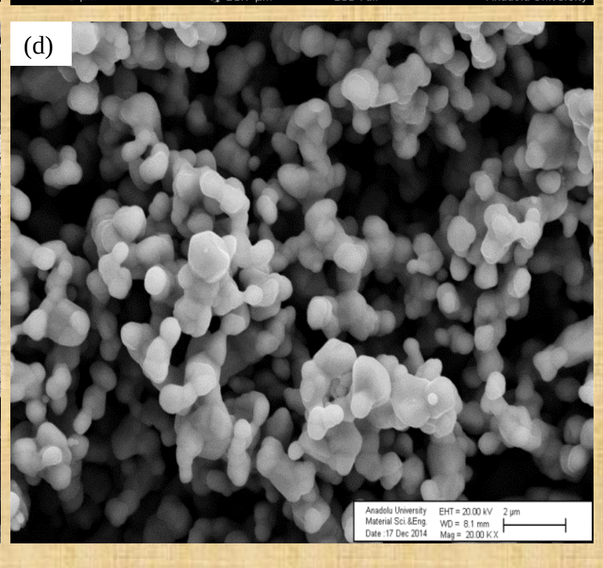


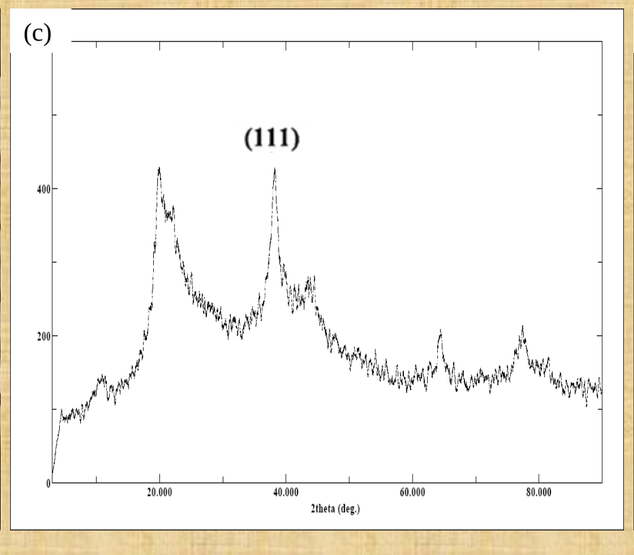












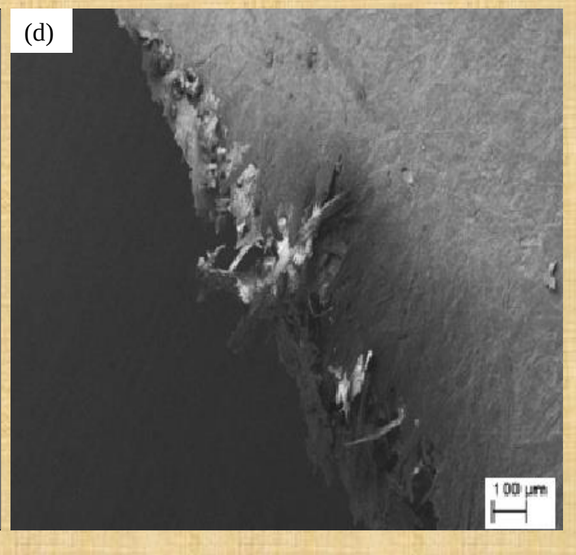


Figure 5- SEM images of (a) and (b) silver nano particles, (c) and (d) silver/chitosan nano composite

Figure 6- XRD images (a) and EDX images of silver nano particles; XRD images (c) of silver/chitosan nano composite; (d) SEM image of tested paper

CONCLUSIONS

Electrospinning method possess many parameters as viscocity, voltage. Our experiments demonstrated that silver nano particles and afterwards dopping in chitosan solution accomplished. However, electrospinning part could not be applied ably due to parameters mentioned above. Thus, forthcoming experimentals will be on making electrospinning method.

References:

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