

185e Study of Growth Mechanisms of Metallic Nanowire Arrays in Porous Substrates

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Metallic nanowire arrays are being employed in numerous applications in diverse avenues. Based on the size, the applications range from sensors and electronic components to novel applications like hydrogen storage by adsorption. Hence, the study of growth mechanisms of nanowires is very essential. Our work involves the study of electrochemical solution-phase growth mechanisms of metallic nanowires in porous substrates ex. PCF (polycarbonate films). Solution-phase electrochemical deposition is being used as it eliminates the practical disadvantages such as cost and complexity of process when compared to other methods like PVD, CVD etc. To study the effect of pore diameter on the growth of nanowires, PCF employed here have pore diameters differing by orders of magnitude. Also, the effect of various other parameters like time of deposition, voltage applied, electrolyte chemistry etc on the growth mechanism is being studied. So far, we have identified axial and lateral growth mechanisms based on the pore-sizes and time of deposition. Further studies are being carried out to ascertain the relations in detail. SEM and AFM are being used to characterize various stages of the synthesis process. We plan to study the growth mechanisms and develop a correlation between various parameters and the type and extent of nanowire growth.