In this talk, I will report on two nanostructured platforms: the MoS2 and MoOx (x=2 and 3) composite thin layers, electrodeposited, onto a Florine doped Tin Oxide (FTO) substrate and porous Si (Psi). In the first platform, our results show a change in relative content of these compounds in different thicknesses ranging from ~20 to 540 nm. The Optical and electrical bandgaps reveal a tunable behavior by controlling the relative content. In addition, a sharp transition from p to n-type of semiconductivity is observed. We find that the spin-orbit interaction of Mo 3d electrons in the MoS2 and MoO3 enhances by significant reduction of the MoO3 content in thicker layers. In the second platform, fabrication of the Porous Si by anodization will be discussed. The different morphology and properties of the pores for potentials below and above 30V classifies the anodization process to two main regimes. The characterization by SEM shows that in the high potential regime a cylindrical or rectangular nanopores can be obtained, while in low potential regime, mostly the cylindrical pores are possible. In addition, interpore, pore diameter and porosity by applied potential is tuned.