Photoinduced superhydrophilicity in niobium and tantalum oxides thin films

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Since its discovery at the end of the nineties by Wang et al.,[1] the interest for light-induced superhydrophilicity is ever growing. The application fields for materials displaying such a property are wide and numerous:[2] self-cleaning surfaces, anti-fogging, anti-bacterial, water and air purification, microfluidics…Nowadays, a research emphasis is on relatively low energy bandgap semiconductors, targeting a higher efficiency under solar irradiation or more precisely in the near UV and low-end of the visible spectral range. Here, however, we report UV-induced superhydrophilicity in metal oxides thin films showing a relatively high transparency in the UV. Reactive ion beam sputtering (IBS) was used to deposit niobium, tantalum and titanium oxides thin films with thickness ranging from 10 nm to 120 nm on fused silica substrates at room temperature. Contact angle measurements were performed for progressively increasing UV doses and also as function of elapsed time after the termination of the exposure in order to investigate the UV-induced hydrophilicity and recovery behavior of tantalum and niobium oxide thin films in comparison to that of titanium oxide deposited in analogous conditions. .

References:

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