Thin films of black metals are characterized by their excessively rough, porous, fractal-like nanostructured surface, capable of strong light absorption. In this thesis, thin films of black aluminium and titanium were prepared using pulsed DC magnetron sputtering in a reactive nitrogen and argon mixture. The structural and optical properties were determined by XRD and diffuse reflectance measurements, while their morphology, thermal stability, and chemical composition were investigated by AFM, SEM, and EDX. Thermochromic materials based on transition metal oxides can change their optical with temperature. WO_3 and phosphorus-doped WO_3 films were deposited by PLD at various substrate temperatures and oxygen deposition pressures. The best reversible thermochromic response, characterized by temperature-dependent optical transmittance and spectroscopic ellipsometry measurements up to 500°C, was observed for a WO_3 film exhibiting a tetragonal crystal structure and a band gap shifting from 2.7 eV to 2.4 eV. Based on our findings, we tested a new heterostructured multi-layer appropriately combining a black metal with a thermochromic material, potentially improving its thermochromic response to light absorption and its subsequent conversion into heat. This combination might be utilized for the development of efficient self-controlled smart absorbers. Furthermore, it has been shown that black Al enhanced the photoluminescence of europium-doped ZnO films.