We present the fabrication and characterization of selective CNT-based gas sensor, which is capable of discriminating between four test gases (NH3, ethanol, CO and CO2). Different metals are utilized in order to alter the response of each sensing element towards the different test gases. We discuss as well the different possibilities for metal combinations in the sensor arrays. The optimum combination between the metallic nanoparticles is obtained through an efficient and quick framework. We study the effect of the thickness of the CNT thin-film on the reproducibility and the response of the sensor array. Furthermore, we investigate the response of the fabricated CNT sensor array towards a mixture of two gases. Such kind of characterization was performed by exposing the CNT sensor array to a mixture of (NH3, ethanol) and (NH3, CO) at different ratios for each mixture. We show that the response towards a mixture of two gases lies in the plane between the data points of each gas separately.