A more modern/high-tech and much more compact version of the condenser microphone uses a permanently-polarized electret-film type material to provide the electrostatic $\vec{E}$ -field in the small gap d_{gap} between the diaphragm (with metalized surface) and the electret film (also with a metalized surface). An electret film consists of a material (*e.g. PVDF* – polyvinylidene fluoride – a piezo-electric material), the molecules of which have a permanent electric dipole moment associated with them, analogous to permanent magnetic materials. Due to the permanent electric polarization $\vec{\text{P}}$ $\left(Coulombs/m^2\right)$ associated with the molecules making up the electret material, the ***surface*** of the electret film has a ***bound*** surface electric charge density, $\sigma_b \equiv \vec{\text{P}}\bullet\hat{n}$ $\left(Coulombs/m^2\right)$ associated with it, which produces a constant/uniform electric field $\vec{E}_{gap}$ between the diaphragm and the electret material, of magnitude $\left|\vec{E}_{gap}\right| = \sigma_b/\varepsilon_o$ with potential difference across the plates of this capacitor of $V_{gap} = \left|\vec{E}_{gap}\right| d_{gap} = \left(\sigma_b/\varepsilon_o\right) d_{gap}$. When an over-pressure $\tilde{p}\left(\vec{r},t\right)$ is present on the diaphragm of this microphone, the voltage across the gap between plates of this capacitor also becomes time-dependent $V_{gap}\left(t\right) = \left|\vec{E}_{gap}\right| \cdot d_{gap}\left(t\right) = \left(\sigma_b/\varepsilon_o\right) \cdot d_{gap}\left(t\right) = \left(\sigma_b/\varepsilon_o\right) \cdot \left[d_{gap} + x_{dia}\left(t\right)\right]$. If this voltage signal is amplified, *e.g.* with a high input impedance FET, it makes for a wonderfully pressure-sensitive microphone, one with excellent frequency/phase response and intrinsically low noise characteristics. A schematic diagram of an electret condenser microphone is shown in the figure below.