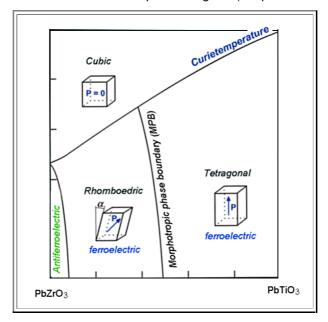
PZT or Lead-Zirconate-Titanate

- PZT is short for Lead (= Pb) zirconate (= Zr) titanate (= Ti) or Pb[Zr_xTi_{1-x}]O₃. It is mixture of PbTiO₃ and ZrTiO₃
 - Both constituents are Perowkites as described in the <u>backbone</u>. For temperatures below the Curie temperature
 we have spontaneous polarization as indicated in the phase diagram (adopted form Wikipedia).



- Both lattice pictures in the phase diagram are hugely exaggerated. Drawn to scale, the eye would not see a difference to a perfect cube. The relation of the axis' in the tetragonal case is about **1,06**, and the angle α in the rhomboedric structure, for example, is around **0.3°**.
 - This rather small distortions are large enough, however, to produce major permanent polarization effects.
- The interesting part is the "morphological phase boundary" (MPB) where the structure changes but not the constituents. Several properties, most interesting for us the "dielectric constant", show pronounced maxima on the MPB; "theoretically" they could diverge to infinity.
 - More down to earth, a mixture of tetragonal and rhomboedric crystals have all together 14 possible directions for spontaneous polarization. In other words, no matter what the external field direction might be, there is always an "easy" direction available in the PZT that is not too steeply inclined to the field direction.
- As always, optimizing the mixture and adding some other "dopants" or better alloying elements, can produce a large range of properties.