Ferroelectric domain structures near the morphotropic phase boundary in the piezoelectric material Pb(Zr$_{1-x}$Ti$_x$)O$_3$ T. ASADA, NISSAN ARC, LTD., Y. KOYAMA, Waseda University — In the simple perovskite oxide Pb(Zr$_{1-x}$Ti$_x$)O$_3$, an excellent piezoelectric response was obtained in the vicinity of a morphotropic phase boundary (MPB) between the ferroelectric monoclinic (F$_M$) and rhombohedral (F$_R$) phases. To understand the origin of the excellent response, we have investigated the detailed features of ferroelectric domain structures near the MPB in PZT by transmission electron microscopy. In the F$_M$ side of the MPB, as a result, there were two types of domain structures at room temperature. On the other hand, a usual domain structure having the 109˚ and 180˚ boundaries existed at room temperature in the F$_R$ side. The notable feature is that each domain in the F$_M$ and F$_R$ domain structures near MPB can be identified as an aggregation of nanometer-sized domains with an average size of about 10 nm. Based on this feature, we propose a new concept of an aggregation-type domain structure for ferroelectric domain structures near the MPB.