For many years, dielectric resonators (DRs) have only been used as high-Q elements in microwave circuits until S. A. Long and his collaborators showed that they can also be used as efficient radiators. The studies were motivated by an observation that carrier frequencies of modern wireless systems had gradually progressed upward to the millimeter-wave region, where efficiencies of metallic antennas can be reduced significantly due to the skin effect. In contrast, DR antennas (DRAs) are purely made of dielectric materials with no conductor loss. This feature makes DRAs very suitable for millimeter-wave systems. The fundamentals and development of dielectric resonator antenna will be discussed in this talk.