Reduction of unwanted light reflection from a surface of a substance is very essential for improvement of the performance of optical and photonic devices. Antireflective coatings (ARCs) made of single or stacking layers of dielectrics, nano/microstructures or a mixture of both are the conventional design geometry for suppression of reflection. Recent progress in theoretical nanophotonics and nanofabrication has enabled more flexibility in design and fabrication of miniaturized coatings which has in turn advanced the field of ARCs considerably. In particular, the emergence of plasmonic and metasurfaces allows for the realization of broadband and angular-insensitive ARC coatings at an order of magnitude thinner than the operational wavelengths. In this review, a short overview of the development of ARCs, with particular attention paid to the state-of-the-art plasmonic- and metasurface-based antireflective surfaces, is presented.