

We have recorded light emission from a surface dielectric barrier discharge with one exposed and one insulated electrode using an intensified digital camera. The discharge was operated in atmospheric pressure air. When the voltage to the exposed electrode is increasing, streamers form and propagate away from the exposed electrode in tens of nanoseconds. When the voltage is decreasing, more diffuse microdischarges form in a few nanoseconds. The qualitative behaviors of the plasma agree well with two-dimensional fluid simulations. Expansion in the average length of microdischarges as the applied voltage changes in both half-cycles of the waveform is also observed.