The work was focused on possibilities of the new technique of nonresonance Raman spectroscopy – drop coating deposition Raman (DCDR) spectroscopy upon study of nucleic acids. DCDR spectroscopy is based on deposition of a small droplet of the studied sample on a hydrophobic surface, where after evaporation of the solvent, ring of the studied material in glass phase is formed. That way the material is concentrated and upon measurements by means of Raman microspectrometry the increase of signal of several orders of magnitude is observed with respect to the standard technique of sample measurements in solvent. In this work we studied behavior of DNA 12-mer and DNA with 3000 base pairs. Our research showed that DCDR spectra of DNA dissolved in deionized water can be measured up to concentration of 30 M per base. The DCDR spectra are similar to those measured from solvents. Nevertheless, the deposited sample never forms a ring. It was shown that the size of nucleic acids didn't play dominant role upon ring formation but their charge which lead to repulsion of the molecules. After adding of sodium ions and subsequently also magnesium ions the ring formation was observed. Factor analysis of spectral maps demonstrated that formed rings are not fully homogenous and that upon their origin condensation of DNA could play a role.