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Counterion Distribution Around Protein-SNAs probed by Small-angle X-ray scattering KURINJI KRISHNAMOORTHY, MICHAEL BEDZYK, SUMIT KEWALRAMANI, LIANE MOREAU, CHAD MIRKIN, Northwestern University — Protein-DNA conjugates couple the advanced cell transfection capabilities of spherical DNA architecture and the biocompatible enzymatic activity of a protein core to potentially create therapeutic agents with dual functionality. An understanding of their stabilizing ionic environment is crucial to better understand and predict their properties. Here, we use Small-angle X-ray scattering techniques to decipher the structure of the counterion cloud surrounding these DNA coated nanoparticles. Through the use of anomalous scattering techniques we have mapped the local concentrations of Rb^+ ions in the region around the Protein-DNA constructs. These results are further corroborated with simulations using a geometric model for the excess charge density as function of radial distance from the protein core. Further, we investigate the influence of solution ionic strength on the structure of the DNA corona and demonstrate a reduction in the extension of the DNA corona with increasing concentration of NaCl in solution for the case of both single and double stranded DNA shells. Our work reveals the distribution of counterions in the vicinity of Protein-DNA conjugates and decouples the effect of solution ionic strength on the thickness of the DNA layer.

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