Binders are the costliest components in paper coatings. In my research, I am using the concept of a Layer-by-Layer (LBL) as a potential method for reducing the amount of binders used in coatings. Two approaches are investigated. In the first approach, films are formed by depositing alternating layers of oppositely charged materials. Separate cationic and anionic suspensions containing pigments and binders are generated. These suspensions are then deposited sequentially on the paper substrate using drawn down coater. One suspension is a standard suspension of anionic particles of calcium carbonate (PCC) and styrene-butadiene latex (SBL) particles and the other contains cationic PCC and cationic SBL. Cationic formulations are generated by the addition of Polydiallyldimethyl ammonium chloride (PDADMAC), a cationic polymer.

In the second approach, pigment binder composites are made in the solution phase. The approach involves the electrostatic aggregation of oppositely charged pigments and binders in the suspension phase. The flocculated suspension is then applied to a paper to generate coating film. The coated papers are measured for porosity, light scattering, opacity, pick test, stiffness and binder migration is analysed by Raman Spectroscopy.

We are anticipating that both approaches will produce coatings of equal strength of conventional coatings but at lower binder content. This will be due to the strong electrostatic attraction that exists between the cationic and anionic formulations in either approach.