Thickness control and interface quality as functions of slurry formulation and casting speed in side-by-side tape casting - DTU Orbit (31/12/2018)

A novel method of co-casting called side-by-side tape casting was developed aiming to form thin functionally graded films with varying properties within a single plane. The standard organic-based recipe was optimized to co-cast slurries into thick graded tapes. Performed numerical simulations identified the stable flow beneath the blade with a shear rate profile independent of slurry viscosity as long as the slurry load in the casting tank was low. Thickness and interface shape could be well predicted if the rheological behaviour of slurries is known and the processing parameters are well-controlled. A well-defined steep interface was obtained by co-casting slurries with similar viscosities above 4000mPas at a speed of 40cm/min. The elastic properties of green tapes were proven to be defined by the binder concentration in the recipe formulation. The interfaces in graded tapes were shown to withstand high stresses identifying a good adhesion between side-by-side cast materials.

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