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Binders for Energetics - Modelling and Synthesis in Harmony LICIA DOSSI, Centre for Defence Chemistry, Cranfield University, DOUG CLEAVER, Sheffield Hallam University, PETER GOULD, QinetiQ Ltd, JIM DUNNETT, Fluid Gravity Engineering Ltd, HAMISH CAVAYE, Centre for Defence Chemistry, Cranfield University, LAURENCE ELLISON, Sheffield Hallam University, FEDERICO LUPPI, Centre for Defence Chemistry, Cranfield University, RON HOLLANDS, BAE Systems Land (UK), MARK BRADLEY, UK Rocket Motors Ltd — The *Binders by Design* UK programme develop new polymeric materials for energetic applications that can overcome problems related to chemico-physical properties, aging, additives, environmental and performance of energetic compositions. Combined multi-scale modelling and experiment is used for the development of a new modelling tool and with the aim to produce novel materials with great confidence and fast turnaround. New synthesised binders with attractive properties for energetic applications used to provide a high level of confidence in the results of developed models. Molecular dynamics simulations investigate the thermal behaviour and the results directly feed into a Group Interaction Model (GIM). A viscoelastic constitutive model has been developed examining stress development in energetic/binder configurations. GIM data has been used as the basis for developing hydrocode equations of state, which then applied in run-to-detonation type investigations to examine the effect of the shock properties of a binder on the reactivity of a typical Polymer Bonded Explosive in a high-velocity impact type scenario. The *Binders by Design* UK programme is funded through the Weapons Science and Technology Centre by DSTL.

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