High Performance Discontinuous Fibre (HiPerDiF) Composites: a sustainable route to the next generation of composites

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The HiPerDiF technology, invented and patented by University of Bristol, is a high speed process to produce highly aligned discontinuous fibre reinforced composites (ADFRCs).

I. HiPerDiF machine overview

II. Increasing Fibre-Throughput

Functionalising fibre to impart electrical charge to increase inter-particle repulsion, thus fibre stability (minimising flocculation)

III. Increasing Interfacial Adhesion

Potential to apply sizing agent via medium (water) leading to enhanced interfacial adhesion between fibre and matrix

Polyvinyl alcohol (PVA):

PVA has widely been used as a coating for fibres. It can dissolve in water, therefore, processable via HiPerDiF. PVA can attach to fibres through covalent bonding (right) or Van der Waals interactions or π–π interactions

IV. Identifying the physics behind the fibre alignment

The HiPerDiF alignment head is simulated with Smoothed Particle Hydrodynamics. Fibres are modelled by rigidly connected particles

V. Industrial partners

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