

Title Shear thickening fluid (STF) in engineering applications and the potential of cork-STF-based composites

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FIGURE 1
STF rheological behaviour and damping enhancement by reinforcing cork composite structures with STF.

Shear thickening fluids (STFs) are remarkable materials that instantly transform from a fluid to a solid-like state when subjected to an impact force, only to return to their liquid form once the force is removed (Figure 1). This unique behaviour makes them exceptional at absorbing impact energy, reducing vibrations, and enhancing damping performance. By dispersing micro- and nanoparticles within a liquid medium, STFs unlock a new frontier in protective applications. This study explores the science behind STFs, delving into their properties, classification, and the fascinating rheological mechanisms that drive their behaviour. Beyond theory, we highlight their real-world potential – from revolutionizing stab-resistant materials and impact protection to pioneering energy dissipation solutions in industries such as battery safety, vibration control, and adaptive structures.

A particularly exciting solution is the integration of STFs with cork – a sustainable, naturally resilient material. By combining the energy absorption capabilities of cork with the dynamic response of STFs, these hybrid materials and structures emerge as a game-changer for impact-resistant applications. This research showcases the versatility of STFs and calls for further innovation, unlocking new pathways for safer, more efficient, and sustainable protective solutions. This work was published in the journal *Advances in Colloid and Interface Science* (DOI: [10.1016/j.cis.2024.103157](https://doi.org/10.1016/j.cis.2024.103157)) and was funded by National Funds by FCT – Fundação para a Ciência e a Tecnologia (FCT), I.P., in the scope of the project 2022.04022.PTDC with the following DOI: 10.54499/2022.04022.PTDC.

