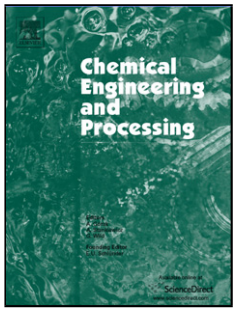

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Hybrid heat pipe screw dryer: a novel, continuous and highly energy-efficient drying technology

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Highlights

- A hybrid technology of material conveyance and drying, termed as Heat Pipe Screw Dryer.
- The heat pipe was characterised to provide the best thermal performance.
- Highest moisture reduction of 46% obtained at 200°C and 260s residence time.
- Energy efficiency was 2.04 kg/kWh, higher than most conventional dryers.
- Overall heat transfer coefficients were ~35% higher than a competing steam-SCD.

Abstract

We report on a novel type of screw conveyor dryer (SCD) with passive heating by an annular heat pipe, 'Heat Pipe Screw Dryer' (HPSD). It was firstly optimised, with its best performance corresponding to the lowest thermal resistances of 0.08–0.18 °C/W achieved at 11% filling ratio and in horizontal orientation. It was applied in the drying of a ceramic raw material slurry (initial moisture 33 wt. %).