

# Sintered plastics control fluids on micro scale

**Tom Shelley reports on some of the applications of very fine-grained, high-purity, sintered plastic.**

Sintered plastic with micro pores can be used for filtration, wicking, venting, fluid control, and the mixing of emulsions.

Many of the potential applications are medical, such as making catheter vents that shut off when liquid is encountered, but devices can be made that are hydrophobic (water hating), which is how they are naturally, superhydrophobic, oleophobic (oil hating) or hydrophilic (water loving), allowing them to be used in an increasingly wide range of applications.

'Vyon' and medical grade 'BioVyon' are both made by Porvair Filtration, based in Wrexham, in sheet, tube or almost any three dimensional form in a range of pore sizes from 10 to 100µm.

Market development manager Claire Jarmey-Swan, chairing a discussion at the recent Medical Innovation Forum in London, showed samples and said that the manufacturing process was 'like making a biscuit'. Porvair's most common products are made by sintering PP (polypropylene) or PE

## DESIGN POINTERS

- Sintered plastic filters can be made in almost any shape to extreme levels of purity with pore sizes from 10µm to 100µm
- They can be made out of a variety of thermoplastics, including PEEK, and while normally hydrophobic, can be made to be superhydrophobic, oleophobic or hydrophilic
- It is possible to laminate on membranes, over mould them and incorporate other solids, and biologically active molecules and species

(polyethylene) beads to produce white sheets with up to 50% voids, but she said it was possible to apply the process to PEEK (polyetheretherketone), PTFE (polytetrafluorethylene), PA (polyamide) and EVA (ethylene vinyl acetate). It is also possible to encapsulate other materials within the sinter, such as active carbon to absorb chemical substances, and polymers that swell when they get wet. This is how the catheter vent shutoffs work.

Unlike other microfiltration media, the material is robust. Samples and small production quantities can be made by rapid prototyping methods, reducing project time and time to market. The clean room based manufacturing process does not require expensive tooling as is the case with conventional plastic moulding techniques and is automated to reduce potential contamination and bioburden. It has

also been found possible to laminate on membranes with a to 0.1µm pore size.

The plastics are approved by the US Food and Drug Administration and by the Water Regulations Advisory Scheme and have passed the requirements of the United States Pharmacopeia and ISO 10993-5 Class VI for mammalian cell growth.

Mechanical structures impregnated with cells or bacteria are used in a number of pharmaceutical preparation processes. Biomedical extraction processes based on passing liquids through impregnated, sintered discs in columns are used routinely. Such constructions offer considerable advantages over extraction columns full of beads, which suffer from channelling through bead beds and also possible bed compaction at higher flow rates. There was also a lot of discussion at the Forum about structures for medical implants that would permit a good interface developing with growing tissue, for which sintered structures sounded very suitable.

Jarmey-Swan said that if two immiscible fluids were pumped through a sintered filter with fine pores, the mixture tends to emerge as an emulsion. This is of particular importance to the food and cosmetics industries. Other applications include: water and chemical filtration, solids handling, sound attenuation, battery venting and vacuum tables in market sectors that include general engineering, aerospace, electronics and beverages. Sintered plastics can relatively easily be made to include other materials such as solid lubricants. Wicking effects are the basis of marker pens but can also be used to apply controlled amounts of liquid lubricants. Production is underpinned by an ISO 9001-2000 quality-assurance programme.

[www.porvairfiltration.com](http://www.porvairfiltration.com)  
[www.wras.co.uk](http://www.wras.co.uk)

*Vyon and medical grade BioVyon from Porvair can be made in almost any three-dimensional form*

