Faculty of Engineering
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Powder processing of porous metals with uni-directionally elongated pore structure

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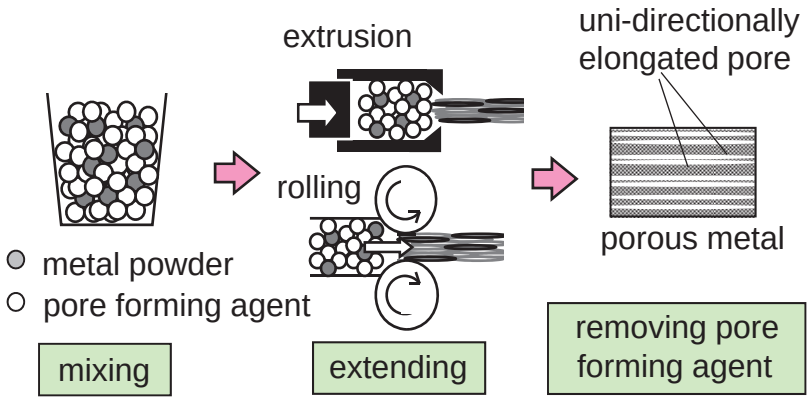
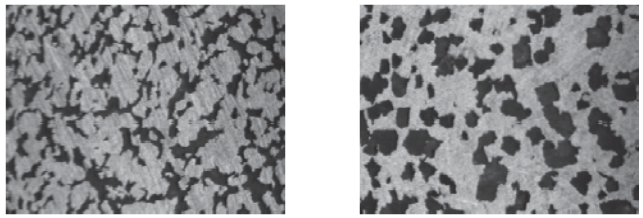


Fig.1 Schematic representation of the processing of porous metals with uni-directionally elongated pore structure



a) porosity : 35vol% b) porosity : 40vol%

Fig.2 Cross sectional microstructures of porous aluminum with uni-directionally elongated pore structure

Content:

Functional characteristics of porous metals, such as filtering properties and shock- or sound-absorbing characteristics, are strongly affected by the pore structure. A powder processing route for unique functional porous metals with uni-directionally elongated pore structures has been developed in our laboratory.

In the process, as shown in Fig.1, the following steps are carried out sequentially: a) mixing a matrix metal powder with a powdery pore forming agent whose flow stress is near to that of the matrix metal, b) extending the mixture by plastic working (extrusion, rolling etc.) to achieve the metallic powder particles adhering each other and c) removing the pore forming agent in a solvent to form a uni-directionally elongated pore structures.

The process shows wide controllable ranges of porosity and pore size (typically 25-70vol% and 0.01-1mm in cross-sectional diameter) . As shown in Fig.2, pore morphology is also widely changeable, so a lower flow resistance can be achieved even at a lower porosity.

Keywords : porous metal, powder forming, pore structure control

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