OAK RIDGE NATIONAL LABORATORY
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Method of Synthesizing Bulk Transition Metal Carbide, Nitride, and Phosphide Catalyst Beads

Disclosure Number

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Technology Summary

This invention describes a new method to prepare catalyst beads of bulk transition metal carbides, nitrides, and phosphides thereby expanding the area of potential industrial applications of these catalytic materials as unsupported bulk catalysts. A simple water-based procedure was developed to shape powders of a range of transition metals into beads. When desired, dopant elements can be easily incorporated during the oxide bead shaping. The procedure can be easily tuned for the control of porosity, mechanical strengths, and dopant content of beads. Activation of as-prepared oxide beads via temperature programmed carburization, nitridation and phosphidation results in bulk metal carbide, nitride, and phosphide catalyst beads, respectively. The produced catalyst beads are catalytically active, mechanically robust and suitable for packed-bed reactor applications.

Inventor

CHOI, JAE S

Energy & Transportation Science Division

Licensing Contact

DETRANA, ALEXANDER G

Rm 139, Bldg 4500N

1 Bethel Valley Road 6196

Oak Ridge, TN 37831

Office Phone: (865) 576-9682

E-Mail: DETRANAAG@ORNL.GOV

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