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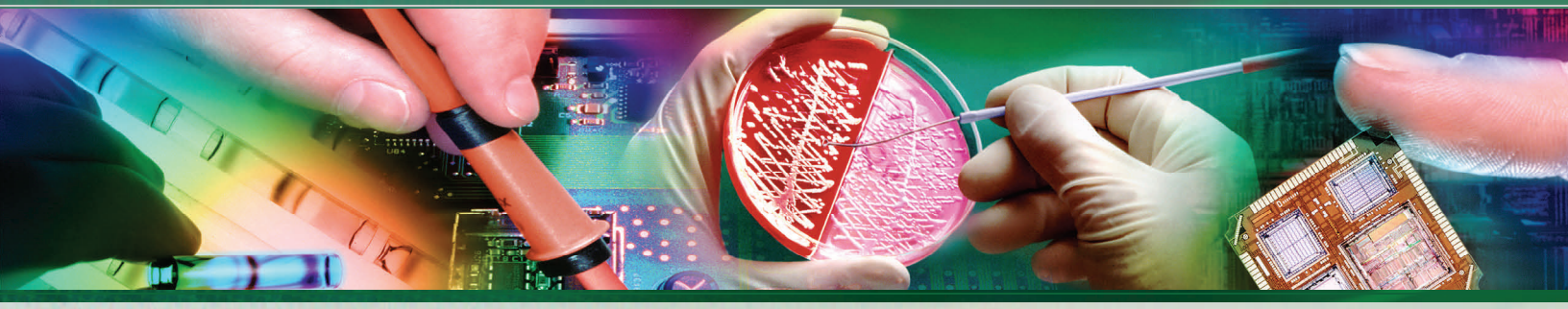
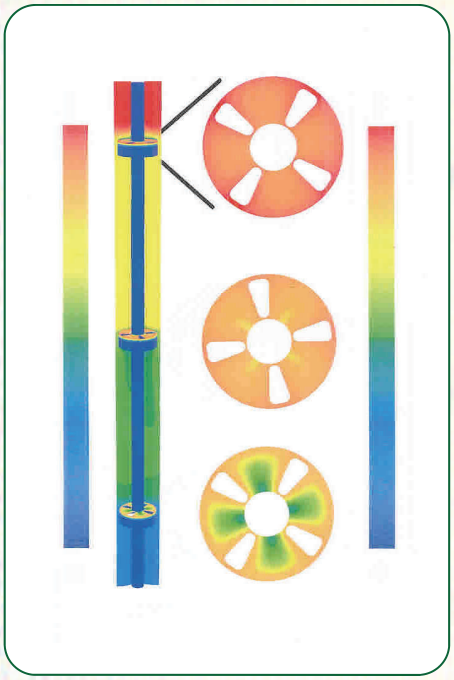


# Vertical Chemical Vapor Deposition: Nanoparticles

The future for chemical vapor deposition of nanomaterials rests on developing techniques and reactors that provide improved homogeneity of the product, provides greater control over the active interfaces, extends the type of materials that can be produced, and provides a means for relative ease in scale-up.

The work of Prof. Amy L. Prieto and post-doctoral fellow Derek C. Johnson is directed to improving the consistency and broadening the use of chemical vapor deposition (CVD) as a method to produce consistent, homogenous nanomaterials. Prieto and Johnson have designed and are now testing a vertical CVD reactor setup. Computational fluid dynamic and heat transfer investigations enable Prieto and Johnson to see improvements in the uniformity of local reactor conditions in the segments of the reactor for which the growth process takes place when compared to a similar horizontal configuration. In the vertical reactor, the bulk fluid flow is essentially perpendicular to the substrate surface. If needed the convective heat transfer can be enhanced by spinning the center shaft and the porous substrate holders.



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**Inventor Information**
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## *Features and Benefits*

- Reduces mass transfer limitations.
- Utilizes a wide range of flow rates and thereby control over species residence time.
- Provides a more uniform operating condition including more uniform temperature profile.
- Increased product yield.

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