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Advanced Micromechanical Process Technologies & Applications

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PURDUE UNIVERSITY | Discovery Park | Birck Nanotechnology Center

Advanced Micromechanical Process Technologies & Applications

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Assistant Professor

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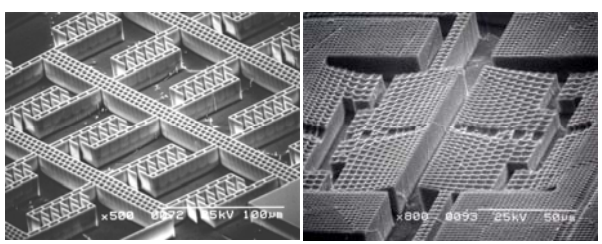
Birck Nanotechnology Center and Center for Advanced Manufacturing, Purdue University

Mission Statement

Our group strives to advance the field of micro/nanosystems through development of novel process technologies that enable enhancement of existing systems, as well as realization of devices and applications that are otherwise impractical or impossible using conventional micromachining methods

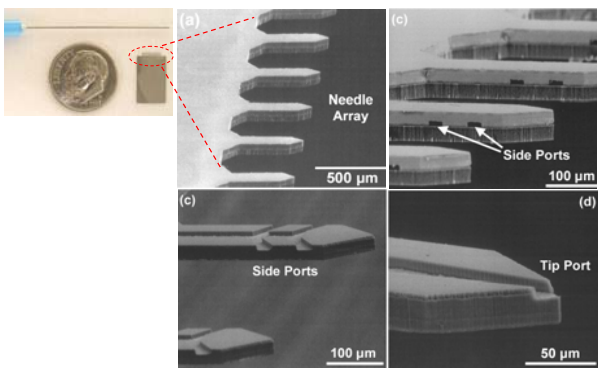
Selected Process Technology: Titanium DRIE[1]



Recently developed process technology enables, for the first time, anisotropic deep etching of bulk ***titanium*** substrates

Provides capability for unprecedented machining resolution & is inherently scalable to low-cost/high-volume manufacturing

Selected Application: Robust Ti Microneedles[2]



Micrometer-scale needles arrays provide opportunity for ***painless*** injection & fluid sampling

Potential applications include: improved glucose regulation for diabetes; transdermal drug delivery; novel cancer therapies; and electrodes for neural implants & epiretinal prostheses

Our innovation: Use of titanium addresses key limitations of current Si-based devices (i.e. mechanical reliability & biocompatibility)

Group Members:

Hugo Aguilar (ME); Vascular stents
In Chul Jang (ME); Micromechanical composites
Cara Smith (ME); Starting Fall 2007

Collaborators:

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Research Sponsors:

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Center for Advanced Manufacturing, Purdue

Selected References:

[1]M.F. Aimi, M.P. Rao, N.C. MacDonald, A.S. Zuruzi, and D.P. Bothman, *Nature Materials* 3 (2004) 103-05.

[2]E.R. Parker, M.P. Rao, K.L. Turner, C.D. Mienhart, and N.C. MacDonald, *accepted for publication in J Microelectromech S.*