

Nanotechnology Law and Policy

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Nanotechnology Law and Policy

Cases and Materials

Victoria Sutton

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TEXAS TECH UNIVERSITY SCHOOL OF LAW

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Campbell, Keith, "South Africa moves to create nanotechnology partnerships with other developing countries." *Engineering News*, February 13, 2009.

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Heller, Jacob & Peterson, Christine, "Nanotechnology and Surveillance." *Foresight Nanotech Institute Policy Issues Brief* at <http://www.foresight.org/policy/brief7.html>.

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- Pinson, Robert, "Is Nanotechnology Prohibited by the Biological and Chemical Weapons Conventions?" 22 *Berkeley J Intl Law* 279 (2004).
- Presna Latina, "Nanotech Development in Cuba Strategic." at <http://www.merid.org/NDN/more.php?id=1217> (Feb. 11, 2009).
- Rosenbaum, Bob, et al., "Israel's Nanotechnology Research Landscape: A Survey of Israeli Nanotechnology Capabilities and Technology Transfer." 4 *Nanotech. Law & Bus.* 109 (2007), Copyright © 2007 Nanotech. Law & Bus.
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