Acquiring Nanotechnology Capabilities: Mergers and Acquisitions in the Nanotechnology Ecosystem

Jan Youtie, Georgia Institute of Technology, USA
Luciano Kay, University of California at Santa Barbara, USA
Ecosystem Perspective - Nanotechnology

- Companies are fastest growing entity

Source: Georgia Tech global nanotechnology information based developed based on Porter et al., 2008 definition.
Small companies - increasing roles in nano ecosystem

Source: Georgia Tech global nanotechnology information based on Porter et al., 2008 definition.
Research Proposition

- The evolution of nanotechnology can be explained not only by R&D, commercialization of active firms but also by patterns of M&A of nano SMEs.
- Acquired firms in the nano domain are posited to provide complementary capabilities (rather than excess capacity).
- Mediating Factors
  - Whether or not the acquiring firm is US-based
M&A and Science-based Entrepreneurial Firms

- Acquisition aims: new competencies, markets, product line, reduce overcapacity (Bowers 2001)
- *Acquisitions preferred over alliances* to acquire new competencies (Villalonga and McGahan 2005)
- Acquisitions with complementary patent portfolios have a positive effect on the acquiring firm’s performance to a point, then becomes *curvilinear* (Cloodt et al, 2005)
- *Post-merger patenting is higher* 3-5 years after M&As with complementary technologies (Makri et al., 2010)
- Complementary M&As more likely *retained in the host country* than those with similar characteristics (Miozzo et. al., 2011)
- Contribution:
  - Focus on mature technology-based industries (using SICs), biotech.
  - No studies of M&A dynamics in nanotech. Yet M&A activity is an important feature of the nanotech commercial ecosystem.
**Method**

- **Target 125 US-based “nano SME” companies for “corporate panel”**
- **All companies with 4+ nano publications or patents**
- **Not in the Forbes Global 2000 or 1,400 world companies, EU Industrial R&D Investment Scoreboard**
- **Random selection with replacement**
- **193 firms selected because 68 either acquired, subsidiaries, out-of-business**
- **20 were M&As**
- **Acquired: Name, Headquarters, Founding year, Industry, Product**
- **Acquiring: Name, Headquarters, Industry**
- **M&A: Date, $ value, Organization, Analysis of similarities/complementarities from news release, website, publications and patents**
Acquired and Acquiring Firms

- Epion
- Conductus
- New Wave Research
- NZ Applied Technologies
- Picolight
- Matrix Semiconductor
- Reactive Nanotechnologies
- Digital Instruments
- Nanodevices
- Molecular Probes
- Molecular Simulation
- Polymer Technology Group
- Millennium Pharmaceuticals
- Immune Complex Corp.
- ImaRx Therapeutics
- Visigen Biotechnologies
- Callida Genomics
- Triton Biosoystems
- Geo-Centers
- Systran

- Tokyo Electron
- Superconductor Technologies
- Electro Scientific Industries
- Corning
- JDS Uniphase
- Sandisk
- Indium
- Veeco, now Bruker
- Veeco
- Invitrogen, now Life Technologies
- Accelrys
- DSM Pharma Chemicals
- Takeda Pharmaceuticals
- Apovia AG
- Cerevast Therapeutics
- Life Technologies Corporation
- SBH Genomics
- Aduro BioTech
- SAIC
- Curtiss-Wright Controls
Industry of Acquired Firm

Biotech more represented in M&A than in nano ecosystem

Nanobiotech comprises 1 in 4 publications, 1 in 9 patents in nano R&D domain, but nearly half of all M&As

but not as nano intensive: (% all pubs. in nano)
• Instruments: 73-75%
• Electronics: 8-80%
• Life Sciences: 8-24%
Value of M&A (USD $millions)
Smaller than average M&A ($700 million in 2005*)

Acquired Firm Geographic Location

- **Number of Acquired Firms**
  - Retained
  - Absorbed

- **Location of Acquired Firm After M&A**
  - Services
  - Instruments
  - Life Sciences
  - ICT/Elect.

- **Non-US**
Complementarities/Similarities in M&A News Releases

- Enhance
- Broaden/Extend/Add
- Accelerate/shortest path
- Complement/Unique
- Scale
- Enter new market
- Lead
- Title
- Similar/cost savings

Number of M&As

Benefit in Press Release
Complementarities greater in patents than publications

Median Publication Ratio = 0.40
Median Patent Ratio = 0.19
Summary

- SMEs account for rising share of nano corporate entry
  - SMEs may serve as innovation source for larger nano firms via M&A rather than excess capacity

- Acquired firms make distinctive contribution
  - Locational distinctiveness (except electronics/IT, which often need integration)
  - Patent portfolio complementarities
  - Benefits in enhancing, broadening, accelerating, complementing

- Future pathways – larger sample, less descriptive