Developing a Successful NSF Science & Technology Center; CLiPS

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Background

- STCs (and ERCs) sit atop the NSF hierarchy of programs
- 5 + 5 years, $4M/yr
- Renewal is common, but requires diligence
- STCs emphasize science, some technologies, not so much device-oriented
- STCs have significant expectations for education and outreach

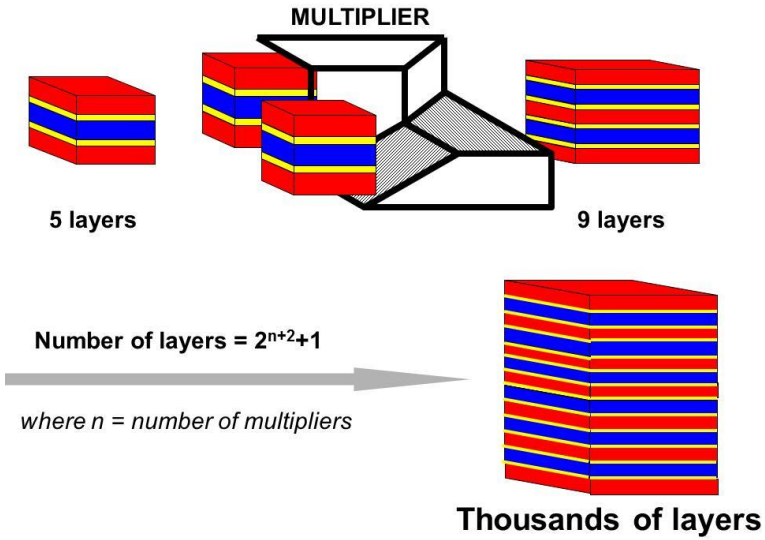
Getting Started (2002 – 2003)

- A group of five CWRU faculty met weekly for ~12 months, often over offsite lunches, to brainstorm the overarching theme
- The first significant concept was developed for a month then discarded; the second lasted for two months
- Finally we decided upon a topic

Getting Started

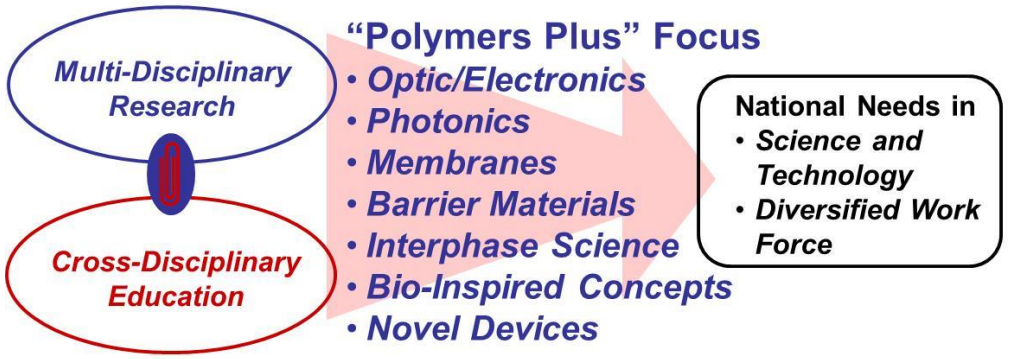
- **Enabling Technology + a Plan for Going Forward**

Enabling Technology – Three Components



Goal 1 – "Polymers Plus" Research

A broad range of new science and innovation will emerge from our unique technology to establish a global resource for micro- and nano-scale layered polymeric systems.



The Process at NSF

March, 2003	STC solicitation issued by NSF
June, 2003	164 preproposals submitted
October, 2003	37 chosen for full proposals
August, 2004	12 chosen for site visits
December, 2004	6 recommended for funding
April, 2005	2 announced, 4 delayed
December, 2005	Decision to move toward funding
August 1, 2006	Funding awarded

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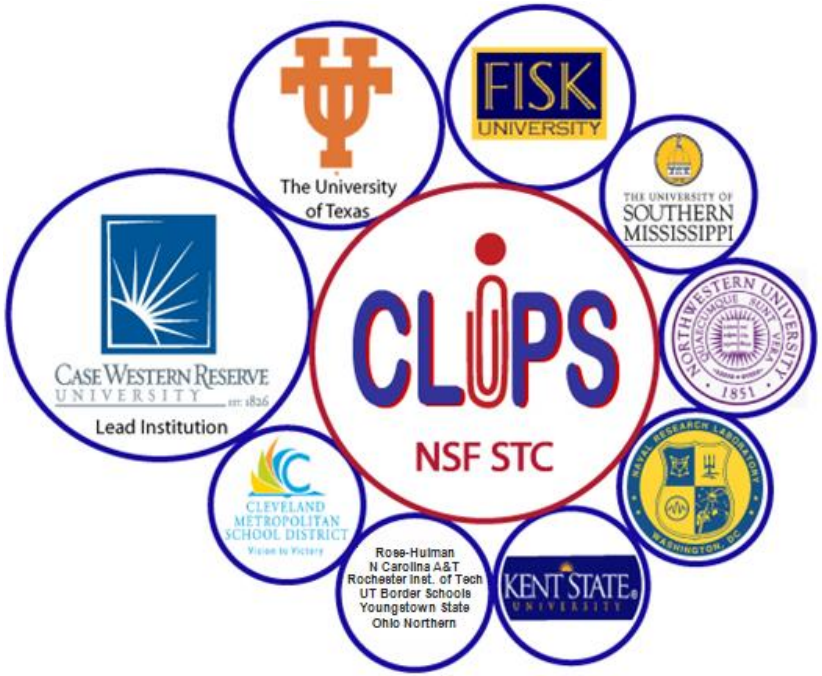
- ***The times between solicitation and pre-proposal deadline, invitation and deadline for full proposals are insufficient. Must write in advance of communication by the NSF***

Getting Started

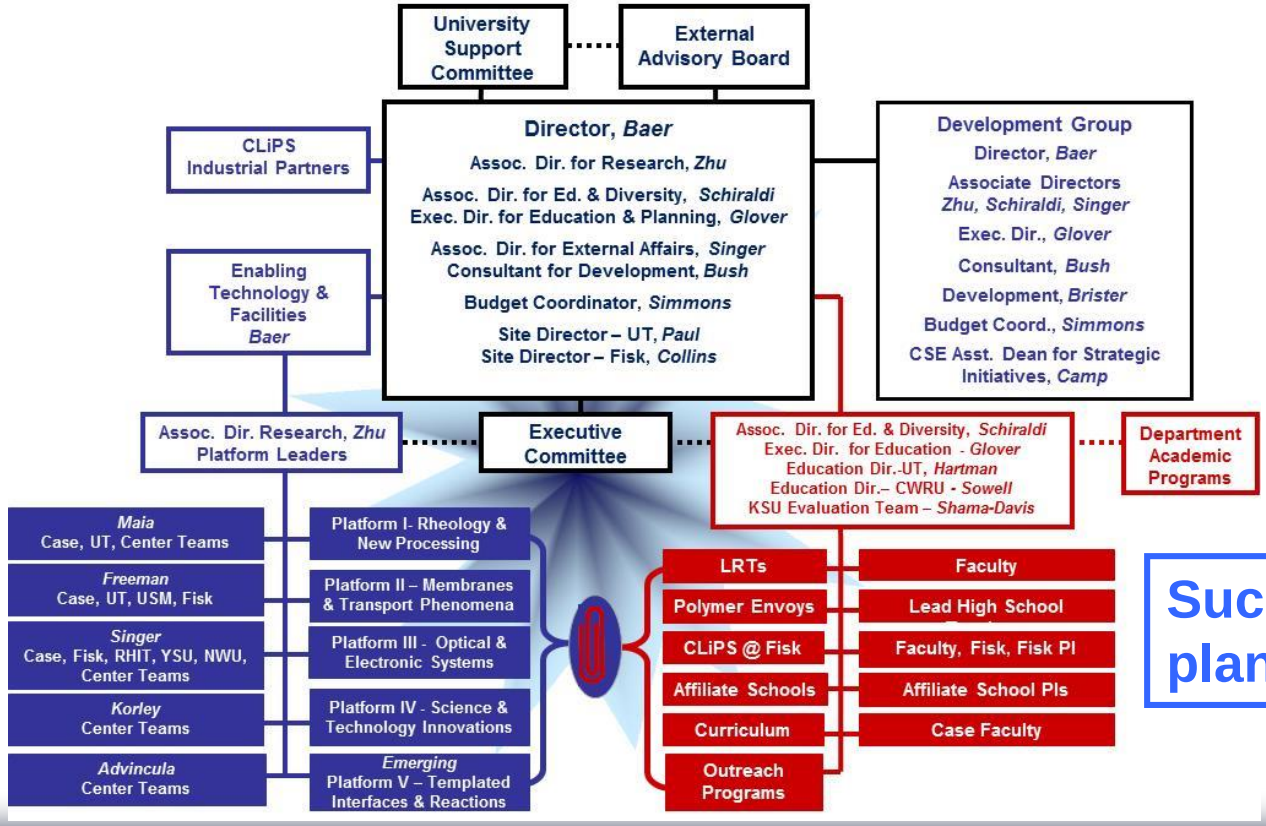
- Moving forward with a leadership team of 3 faculty, plus another 3 key faculty
- Hired an external grant writer
- Divided concept areas to develop
- Commitments from University Administration is essential (faculty, space, grant preparation)

Team



- Initial team 5 research universities + 5 PUIs
- Current team 7 research universities, 1 national lab, 2 majority PUIs and 5 HBCUs
- Initially 13 research faculty, now 22
- Change is ok

Organization and Management



Succession planning required

Operations

- Executive Committee meets every month (phone)
- Thrust team leaders meet every month (phone)
- Each thrust team meets once per month
- Entire STC meets once per year for a technical and administrative exchange – planning and prep

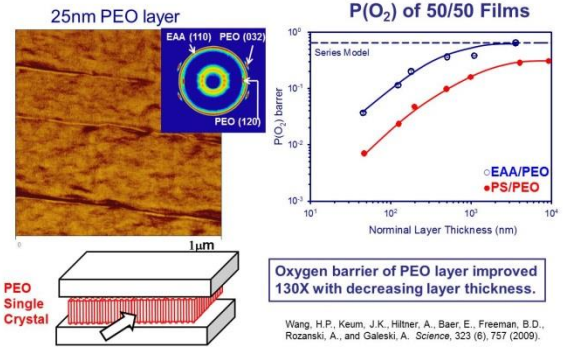
- All coordinated by an *executive director*, who also makes site visit arrangements, collates outputs and assembles annual reports

Assessment

- External assessment is essential, and should be listened to
- Significant changes in the CLiPS Education program, responsive to the assessment, were made after year 3
- Assessment team contributes to the annual reports, and presents at annual site visits

Impact - Science

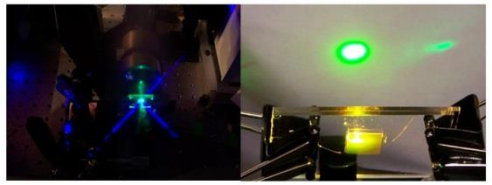
Layered Systems for Confined Crystallization: PEO/EAA and PEO/PS Multilayered Films

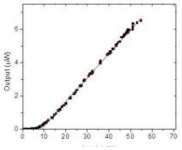


Oxygen barrier of PEO layer improved 130X with decreasing layer thickness.

Wang, H.P., Keum, J.K., Hiltner, A., Baer, E., Freeman, B.D., Rozanski, A., and Galeski, A. *Science*, 323 (6), 757 (2009).

All-Plastic Distributed Bragg Laser





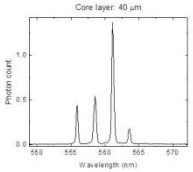
BEST PERFORMANCE:

90 μJ/cm² threshold

19.3% for a R6G sample

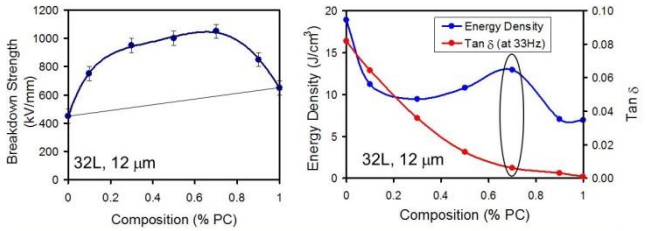
Opt. Express, 16, 10358 (2008)

Selected for Optics in 2008 Research Highlights, OPN



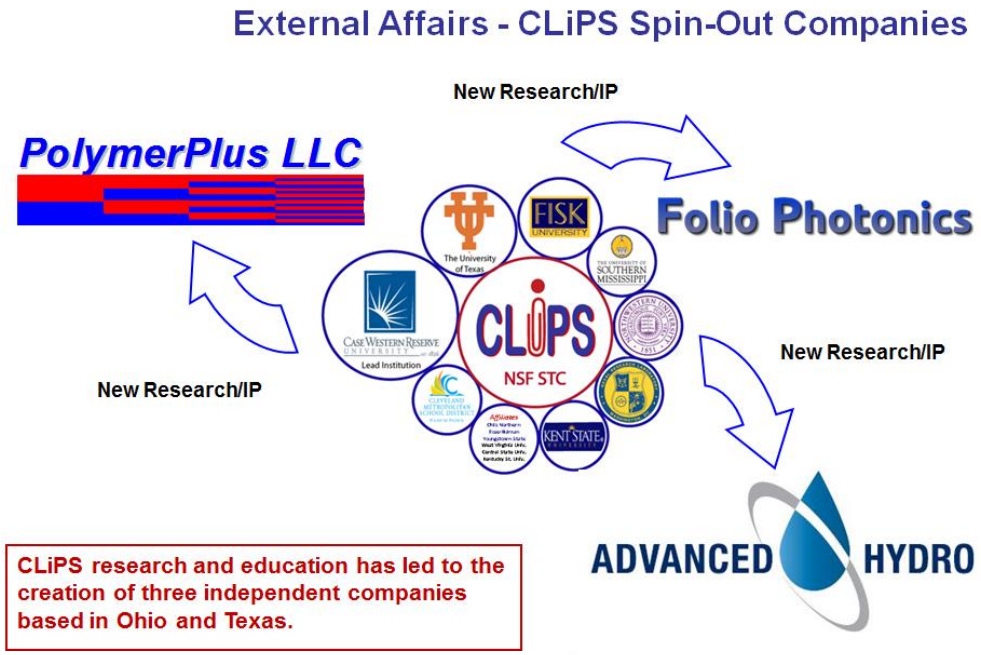
High Energy Density Capacitor Film

Layered films have enhanced breakdown strength and energy density compared to controls



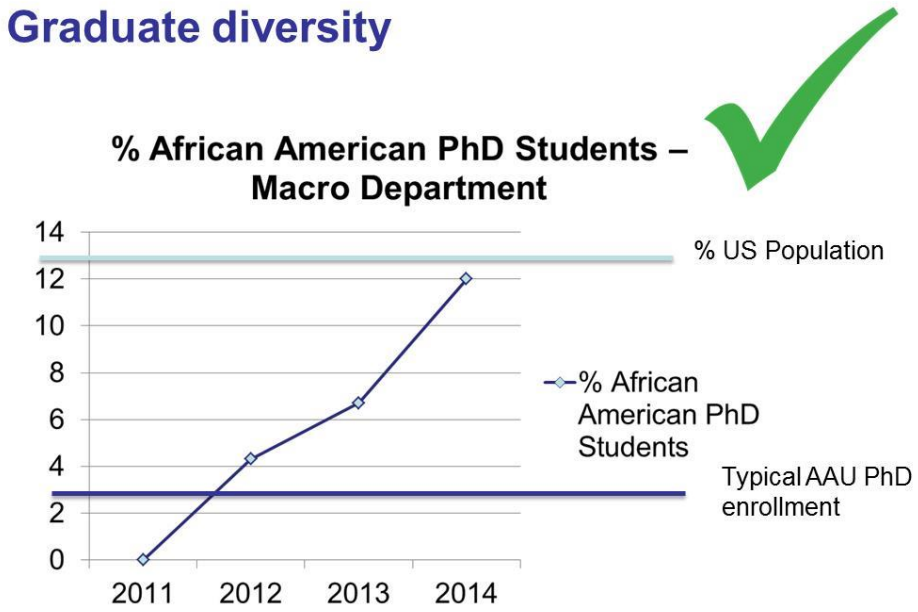
70PC/30PVDF-HFP composition has the best properties for a high quality high energy density capacitor: high energy density and low tan δ

Impact - Technology



- 6 U.S. patents issued/10 pending
- 3 Spin offs
- Several grants spun off

Impact – Education & Outreach



- Led to 5 faculty hires
- New graduate curriculum at CWRU
- Transplanted courses to HBCUs
- Envoys outreach program has changed the lives of 60 inner city students

Legacy

- Faculty, curricula, collaborations continue
- Spin off companies
- Grants seeded by CLiPS funding
- New major proposals being formulated (see slide 3)
- Continuation of outreach programs a major emphasis of PIs, Development Departments

Final words

- The funds were obviously important
- The program continues in new forms
- It was worth all the required efforts


Thank you