

Prospectus for the 2nd SRC Bioelectronics Roundtable

Dates: March 25-26, 2010

Location: Howard Hughes Medical Institute (HHMI) Janelia Farm Research Campus
19700 Helix Drive, Ashburn, VA 20147

Expected Outcome: Identification and prioritization of research topics for first phase of proposed SRC bioelectronics research initiative.

Prospectus: The use of semiconductor technology in applications related to health and medicine is an area with enormous potential. Challenges and needs arise from aging populations, rising healthcare costs, the growing number of injured veterans, and the dearth of basic healthcare for those in developing countries and remote areas. There are many examples of “smart” electronics that improve healthcare and quality of life, such as pacemakers, image-guided surgery, and programmable insulin pumps. The dramatic rate of miniaturization and increased functionality of integrated circuits and other manufactured devices, combined with similar rates of progress in biology and medicine, open the door for significant leaps in the ability to detect, diagnose and treat disease and hopefully avoid many long term effects—early and affordably, and on a personalized basis.

Realization of the benefits of “bioelectronics”—that is, technology at the interface of biology/medicine and electronics—depends on engagement and coordination among diverse stakeholders. It requires collaboration among researchers in various disciplines, including the life and physical sciences and engineering, along with clinicians and other practitioners. It also requires the involvement of technical experts from the semiconductor electronics and biomedical industries, who can translate research results into practical applications and useful products. Government agencies - such as NIH, NIST, NSF, DARPA, and FDA - will play crucial roles in supporting and guiding this area of research and development. Finally, there is a need to optimize the synergistic potential of these interactions and the flow of options through the pipeline from research to commercialization. This can be achieved by applying efficient, effective, and proven mechanisms and processes for setting direction, managing and coordinating the research, and disseminating the results. This is SRC’s mission and core expertise.

SRC was founded in 1982 by visionary leaders of the semiconductor industry. Its primary objectives are to: Support the competitiveness of its members (individually and collectively), explore new technologies, stimulate industry-relevant academic research, promote greater academic collaboration, and generate a pool of experienced faculty and relevantly educated students. Since its inception, SRC has managed over \$1.3 billion in basic academic research at over 240 universities worldwide and supported over 7,500 students, who have gone on to become the next generation of leading edge researchers, technology innovators and industry leaders. Processes and infrastructure developed by SRC identify and communicate industry’s collective basic research needs, connect the academic faculty and student researchers with

industry “users”, support university research with high impact potential, and deliver early results to members via online systems.

In November 2008, with support from NIST, SRC hosted a bioelectronics roundtable (BERT) of thirty experts from academia, industry and government that explored a range of synergistic application opportunities in the broad area of bioelectronics. A recommendation from this event was for industry and government stakeholders to focus on a few high-impact application areas and to develop a Bioelectronics Roadmap, which would provide a framework for bioelectronics research and development. Such an exercise would define application-specific research goals, metrics, and timelines.

The second Bioelectronics Roundtable (BERT2) is the first step in developing a bioelectronics roadmap and will provide the foundation for an interdisciplinary academic bioelectronics research program that is basic, yet “use inspired”. Key experts from industry and government will identify and prioritize research topics of mutual interest. This proven balanced approach will enable critical technology advances and develop a cadre of faculty and students with relevant expertise.

Key Questions: Presentations and discussion of research opportunities will focus on:

- What is new and why does this application area warrant consideration, i.e. what are the drivers, unmet bio/medical need(s)/objective(s) and potential market size?
- What specific research needs are driven by this application, i.e. what scientific /technological challenges and barriers must be addressed to enable this application?
- If successful, what is the potential impact of this application and what are its benefits/advantages over current capabilities/technologies? Please clarify the limits of current approaches.
- What are the research metrics for success, i.e. what near, intermediate and long term (3-5, 5-10, and >10 yr, respectively) research targets represent significant progress towards achieving the objective?
- What are the projected research resource requirements, i.e. what levels of funding, people, time, and/or facility resources are needed?

Format: The roundtable is by invitation only and all attendees are expected to participate. The program will be broken into three sub-topics: *ex vivo* systems, *in vivo* systems, and imaging systems. On Day 1, sessions on each topic will include an overview and presentations on proposed application-driven research topics, followed by discussions in small breakout groups. Each breakout group will provide an initial screening of the applications, associated technology barriers, and the research needed. Day 2 will begin with a summary of the results of the Day 1 subtopic sessions and the breakout groups will reconvene to evaluate and prioritize the collective research recommendations from all three sessions. Each group will identify the top research opportunities. The meeting will conclude with a moderated plenary discussion to develop consensus on the top research priorities and recommendations for organizing and implementing a research initiative.