

THIRD PLACE: NATIONAL CANCER INSTITUTE
NATIONAL INSTITUTES OF HEALTH

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“SELECT100™ MULTI-SPECIMEN LOADER AND IMAGE ACQUISITION SYSTEM”

Over the last 15 years, the application of computers to microscopes has significantly enhanced the level of automation that is possible once a specimen has been inserted into the microscope. A long-standing bottleneck has been the automated delivery of multiple specimens into an electron microscope, and overcoming this has presented researchers with significant challenges. The Select100™, described in this Nomination, is an automated specimen-loading system that permits sequential examination of as many as 100 specimens on any modern transmission electron microscope capable of computerized operation.

The Select100™ provides an unprecedented level of automation as well as a 10-fold increase in specimen throughput. It is now possible to screen a large number of specimens using transmission electron microscopy without user intervention.

The Select100™ was invented by Dr. Sriram Subramaniam, Chief of the Biophysics Section in the Laboratory of Cell Biology of the National Cancer Institute. Following the conceptualization of the technology, a Cooperative Research and Development Agreement (CRADA) was executed between NCI and Gatan, Inc., the world's leading manufacturer of instrumentation and software for electron microscopy. Software development was led by NCI, and the construction of the Select100™ was led by Gatan. The CRADA was extended twice to accommodate unexpected innovations. The Select100™ is now commercially available through Gatan. The success of this CRADA has resulted in discussions about future collaborations between NCI and Gatan.

The level of automation provided by the Select100™ has made a significant impact on the throughput of specimens that can be examined every day, leading to a more comprehensive screening for research in several technological disciplines. The improvements made possible by this technology have been disseminated throughout the scientific community at numerous conferences and through co-authored publications. There are also ongoing efforts to improve the design of the system and to facilitate market expansion of the Select100™. The increases in data throughput enabled by the Select100™ can be expected to drive further innovation in the speed of image processing. For example, the Select100™ could enable personalized medicine, in which drugs are tailored to an individual's genetic profile. Given the unprecedented improvements in existing technology that have resulted from the CRADA between NCI and Gatan, there are additional benefits from future research opportunities, collaboration, and technology transfer.