

SOFTWARE FOR AUTOMATED GENERATION OF DENSITY MAPS

SUMMARY

The technology available for licensing or co-development is computer software for the automated generation of density maps of macromolecular structures from a series of 2D digital micrographs of frozen hydrated specimens collected using an electron microscope equipped with an ultra-cooled computerized stage.

REFERENCE NUMBER

E-162-2012

PRODUCT TYPE

- Software

KEYWORDS

- macromolecular structure
- cryo-electron microscopy
- density map
- tomogram
- tomography

COLLABORATION OPPORTUNITY

This invention is available for licensing and co-development.

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DESCRIPTION OF TECHNOLOGY

The [Laboratory of Cell Biology](#) at the National Cancer Institute (NCI) is seeking parties interested in collaborative research to co-develop software for the automated determination of macromolecular structures using cryo-electron microscopy.

The technology available for co-development is computer software for the automated generation of density maps of macromolecular structures from a series of 2D digital micrographs of frozen hydrated specimens collected using an electron microscope equipped with an ultra-cooled computerized stage. A series of images of biological specimens collected at different tilt angles relative to the electron beam are aligned to compensate for mechanical errors of the stage and combined to obtain 3D images

(tomograms). Sub-volumes containing a single macromolecular complex can be extracted from the 3D image of a protein solution, or from a suspension of viruses or cells. The individual sub-volumes of identical structures are aligned and averaged together to generate a density map of the macromolecular complex of interest.

POTENTIAL COMMERCIAL APPLICATIONS

Macromolecular imaging, mapping of molecular interactions, and determination of molecular structure and reactivity.

COMPETITIVE ADVANTAGES

Noise processing, algorithmic averaging

INVENTOR(S)

Mario Borgnia (NCI)

DEVELOPMENT STAGE

- Prototype

PUBLICATIONS

1. Amat F, et al. Markov random field based automatic image alignment for electron tomography. *J Struct Biol.* 2008 Mar;161(3):260-75. [PMID 17855124]
2. Bartesaghi A, et al. An energy-based three-dimensional segmentation approach for the quantitative interpretation of electron tomograms. *IEEE Trans Image Process.* 2005 Sep;14(9):1314-23. [PMID 16190467]

PATENT STATUS

- **Not Patented:** Research Tool. Patent protection is not being pursued for this technology.

THERAPEUTIC AREA

- Cancer/Neoplasm