Crystalline Permutations at CNSI

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MAT200a

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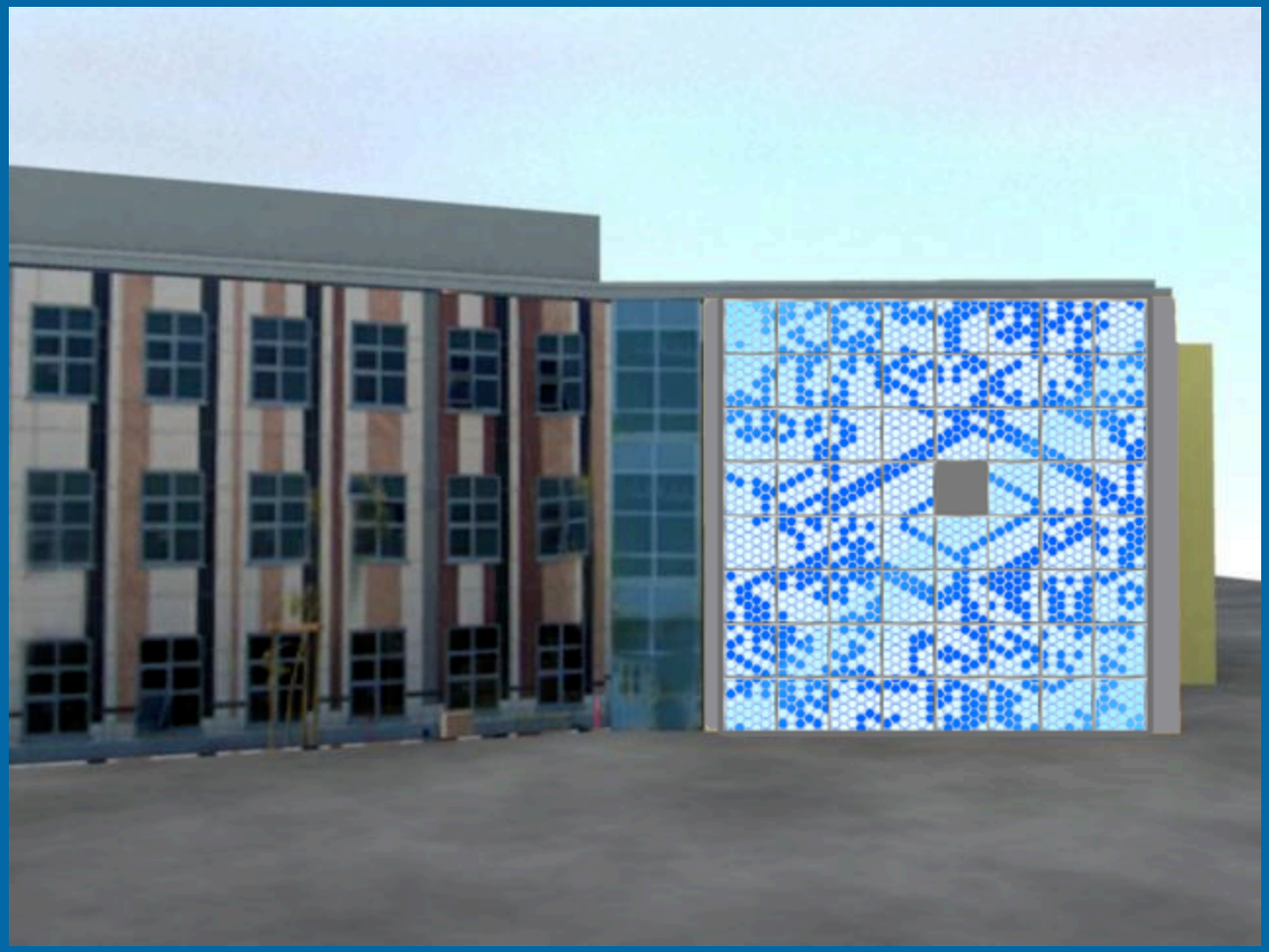
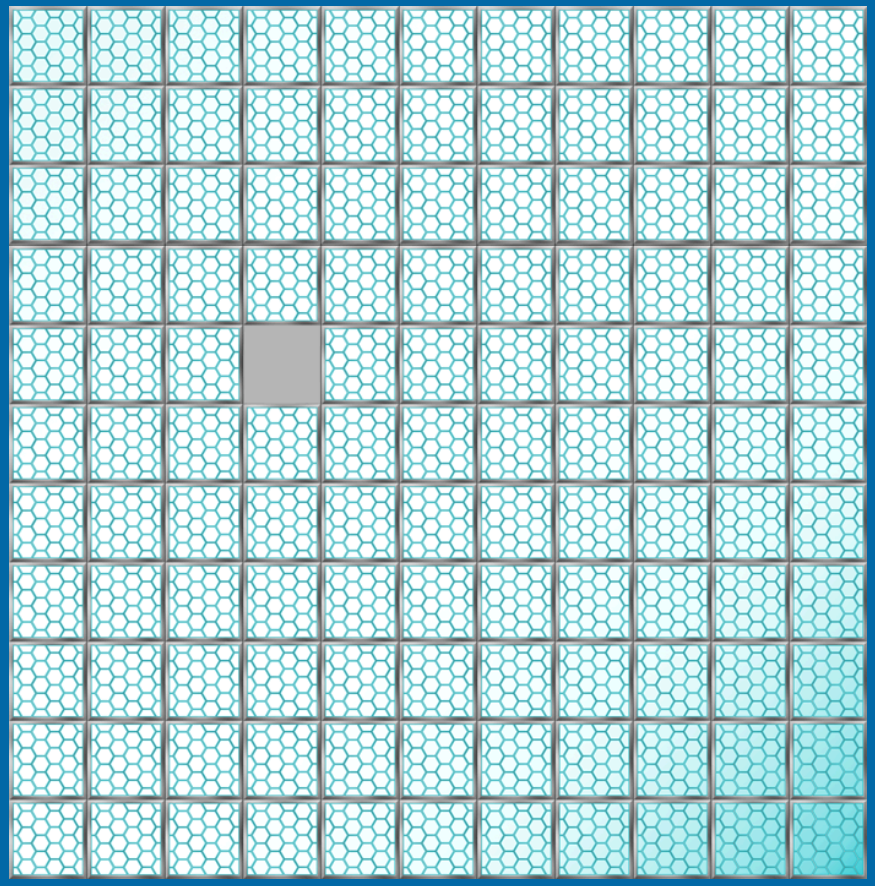
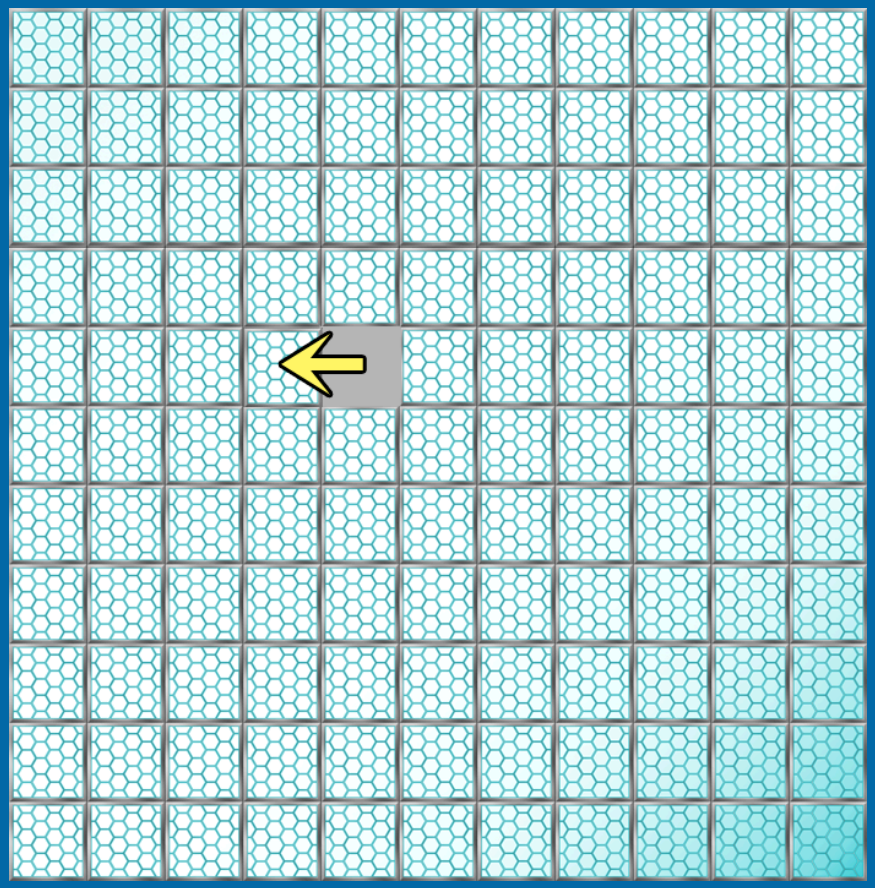
Proposal to represent the activities and significance of California Nanosystems Institute (CNSI) through a visualization/installation artwork.

The ***reorganization*** of matter is embodied in this site-specific art installation consisting of a nested matrix of shifting ***crystalline*** and ***non-crystalline*** structures throughout which global patterns ***diffuse*** over time.



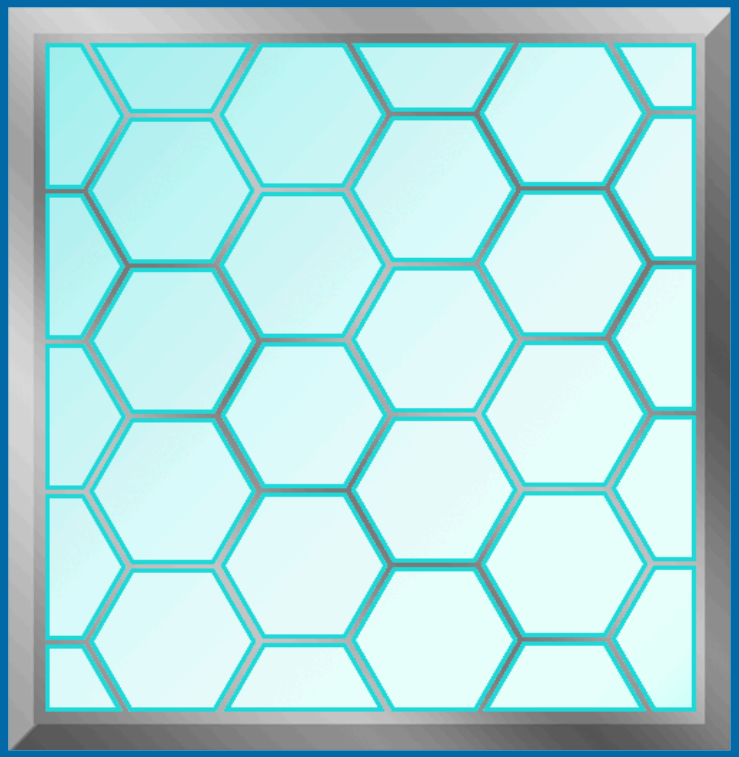


Non-crystalline shifting grid of square panels:
reorganization of matter



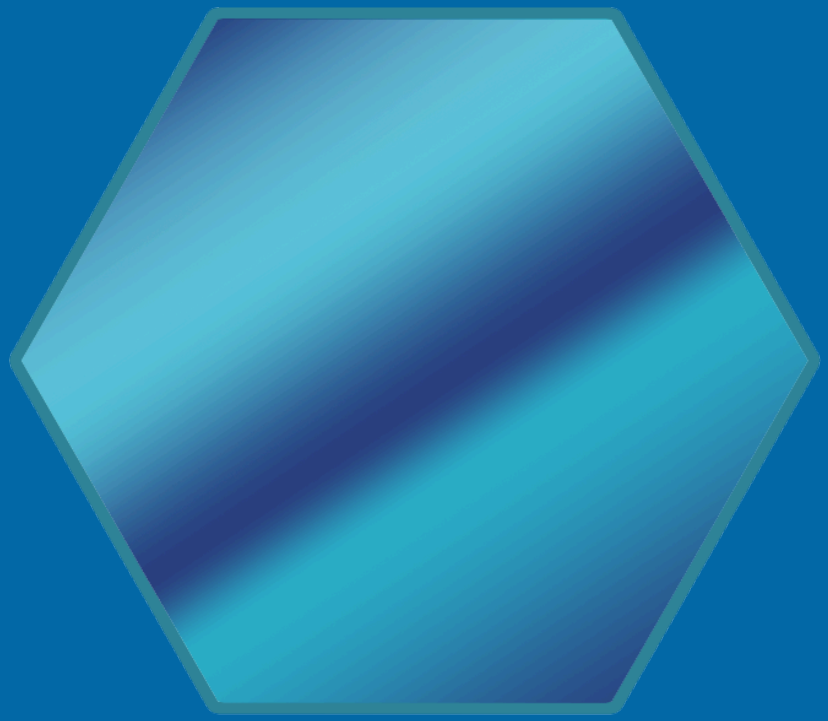
Movement of grid panels driven by creation of knowledge within CNSI

UCSB journal collection monitored by software agent



Hexagonal, ***crystalline*** structure of electrochromic glass

Electrochromic glass:
Applied potential prompts transition from transparent to opaque



Electrochromic glass:
Applied potential prompts transition from transparent to opaque

Cell opacity determined by six nearest neighbors
(cellular automata)

Three unique nearest-neighbor rule sets determine opacity:

Physics: symmetry – mirrored left/right/top/bottom neighbors

Chemistry: chirality – only neighbors on one side affect state

Biology: meiosis/mitosis – exactly two neighbors must be opaque

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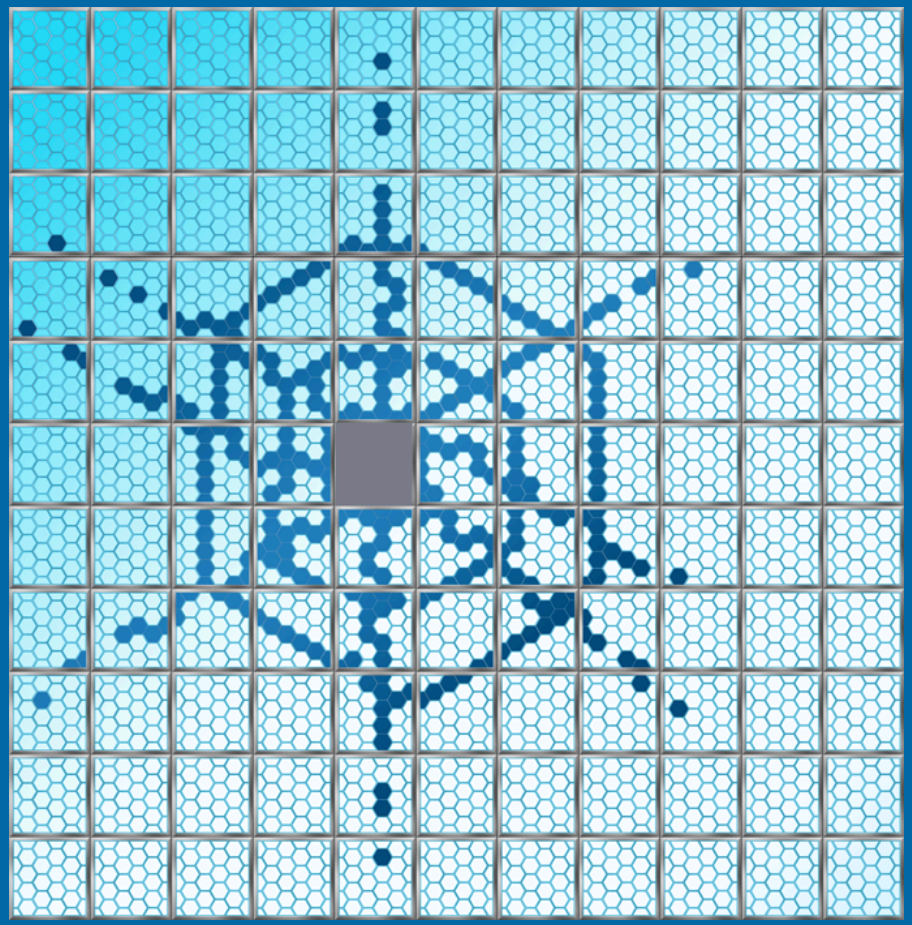
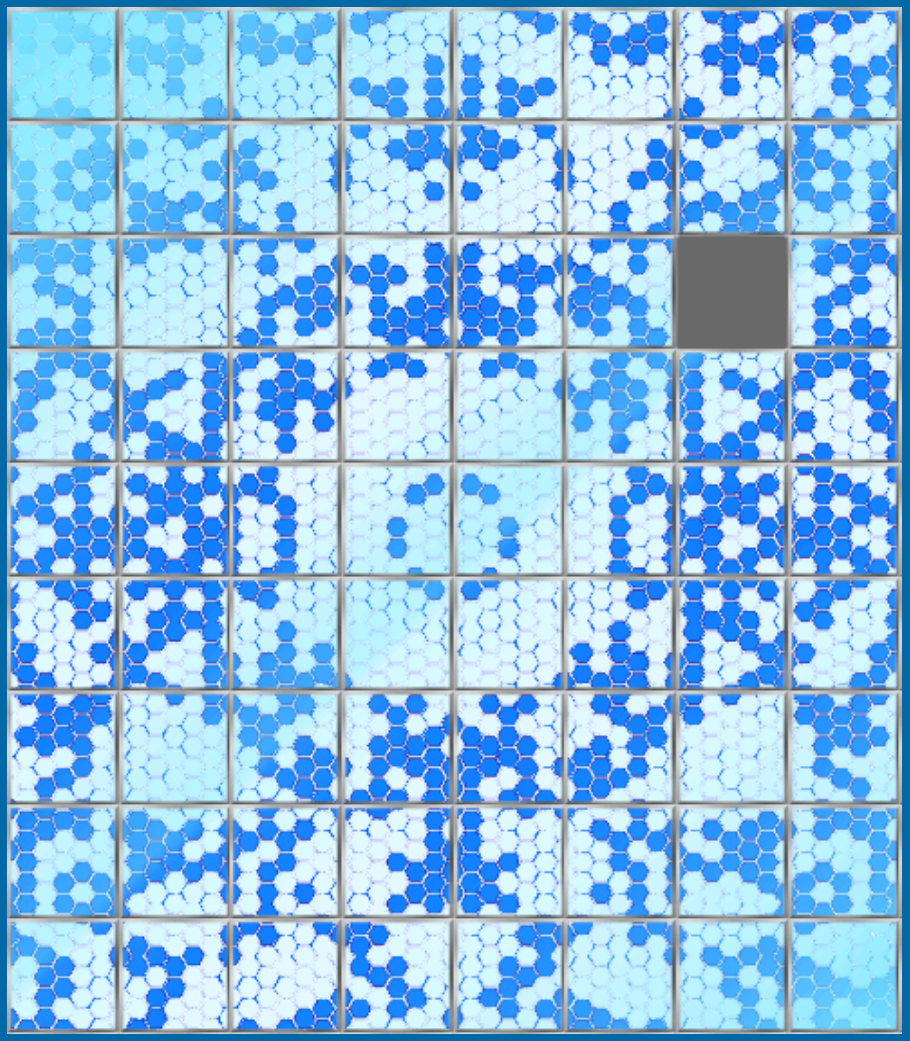
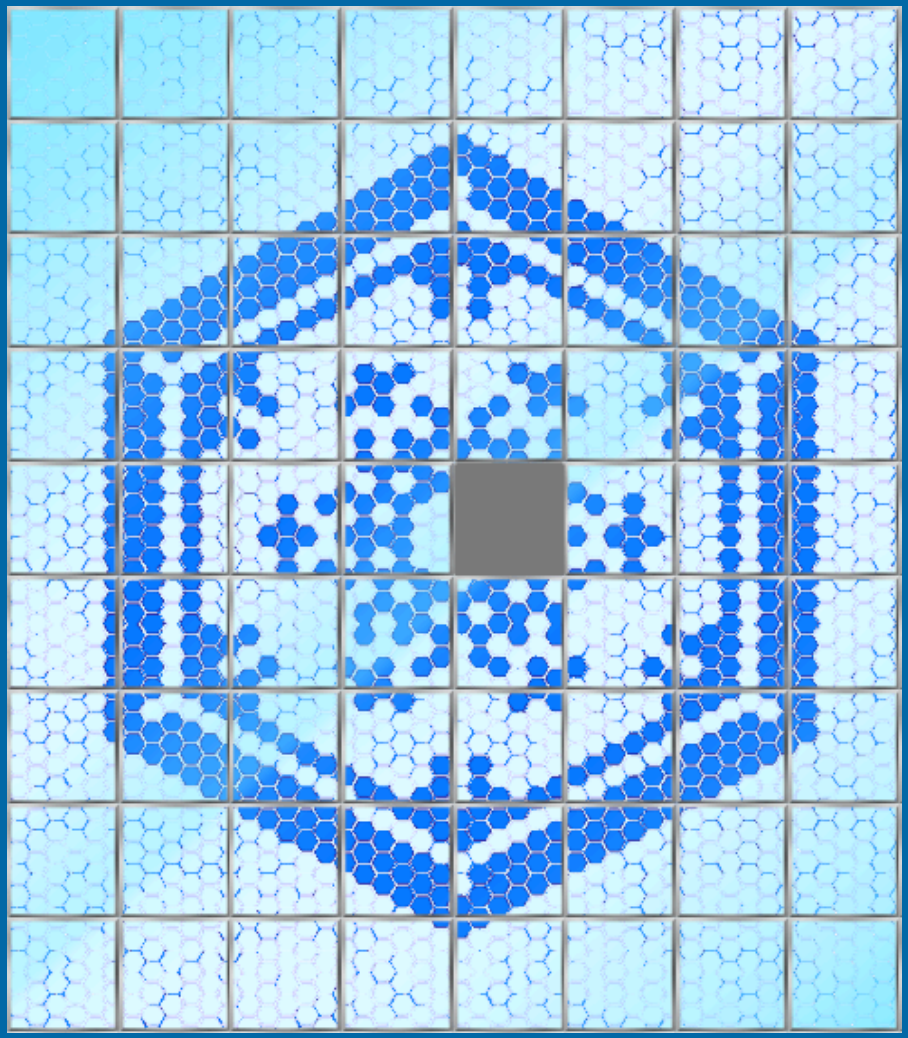
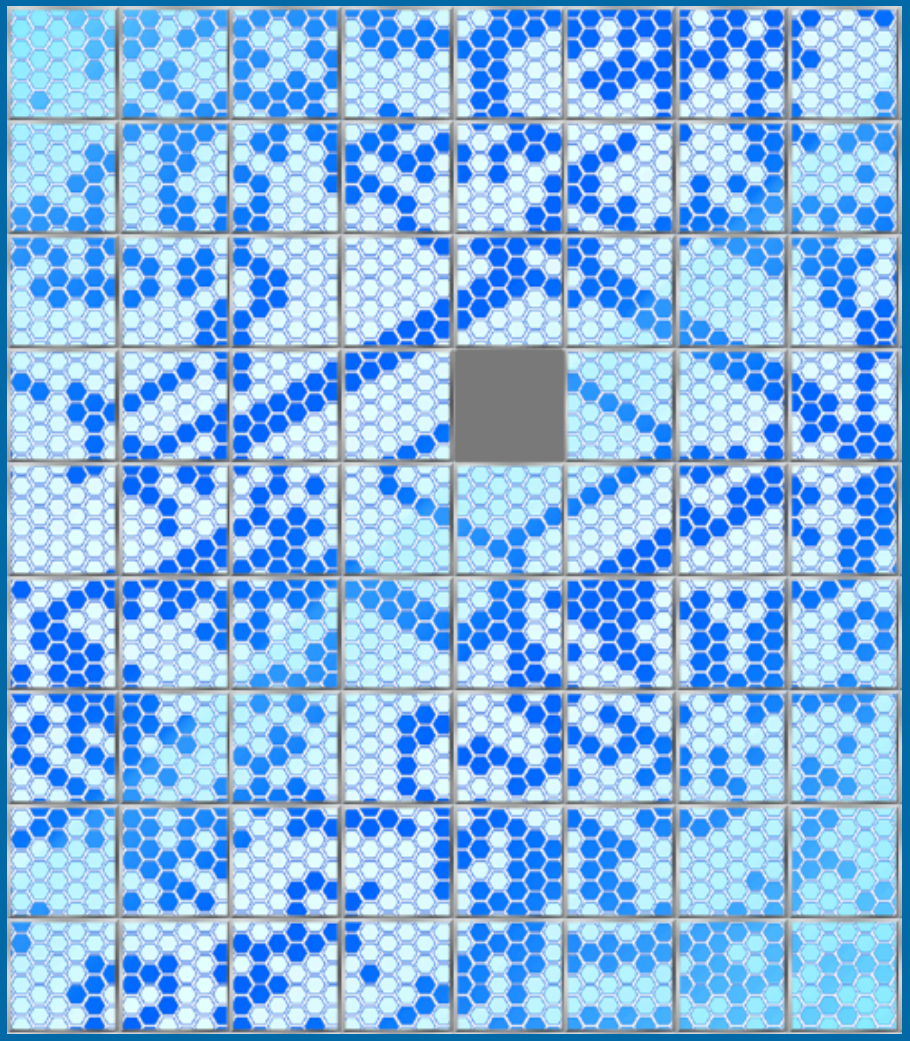
Knowledge created > grid panel moves > cells adjust to new structure > new pattern diffuses









Additional Considerations

- Slow transitions and lack of active lighting result in noninterference with vehicle and air traffic.

- Low energy usage: electrochromic glass only requires power during transition, and acts as a "passive pixel".

About CNSI

The California Nanosystems Institute is a research facility involved in the discovery, development, and commercialization of materials and processes at the nano-scale.

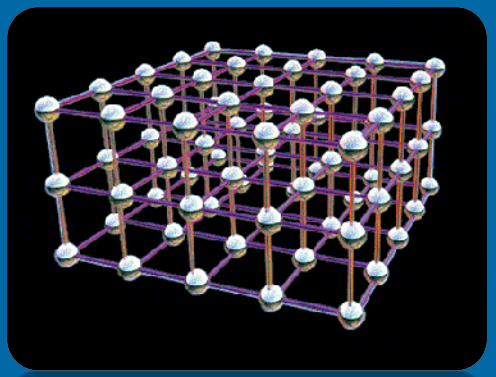
This includes a diverse collection of faculty working in physical, chemical, and biological fields, primarily concerned with the ***reorganization*** of matter into useful and commercializable forms.

Crystalline Structures

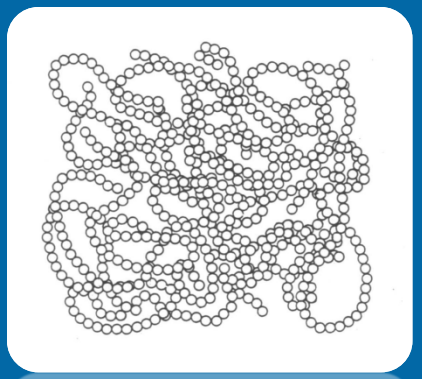
The tools and facilities in CNSI are used to interrogate organic and inorganic materials.

Methods such as nuclear magnetic resonance spectroscopy, x-ray diffraction, and electron microscopy characterize materials in two main categories:

crystalline



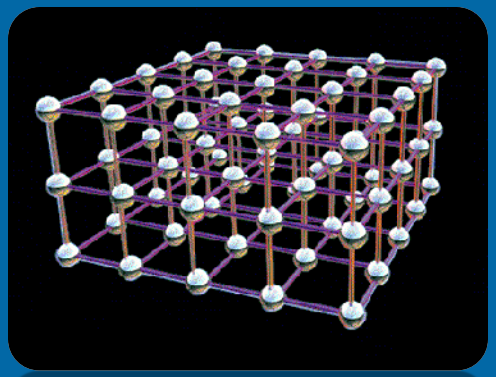
non-crystalline



Crystalline Structures

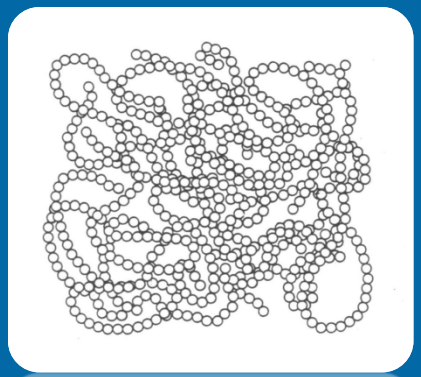
Crystalline structures:

Characterized by a repeating 3-D pattern of atoms/molecules/ions with fixed distances, e.g., gold.



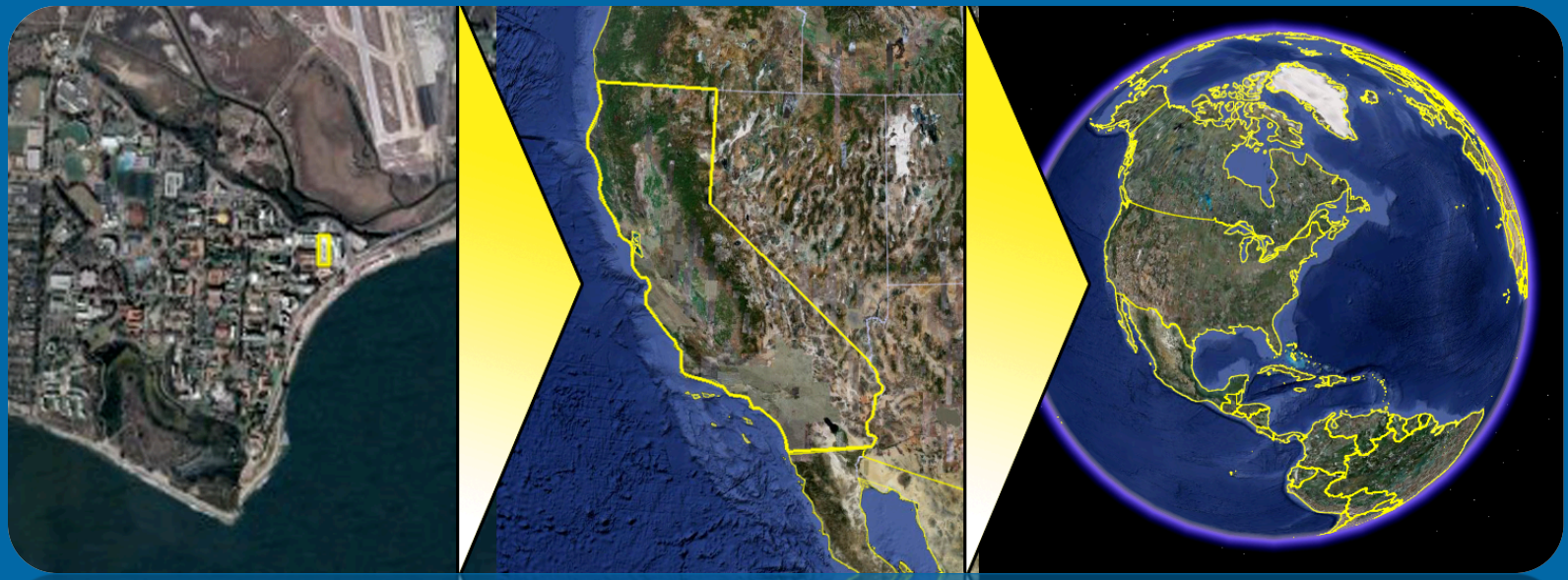
Non-crystalline structures:

Not fixed in 3-D, but may contain periodicity, e.g., proteins.



Diffusion of Knowledge

The knowledge created at CNSI is intended to ***diffuse*** throughout the local, regional, and global marketplaces in order to reaffirm California's role as a leader in cutting edge science and technology while strengthening its economy.



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