NSF/CHE Funding Priorities

Biden-Harris Administration Executive Office Priorities (M-21-32):

Pandemic readiness and prevention

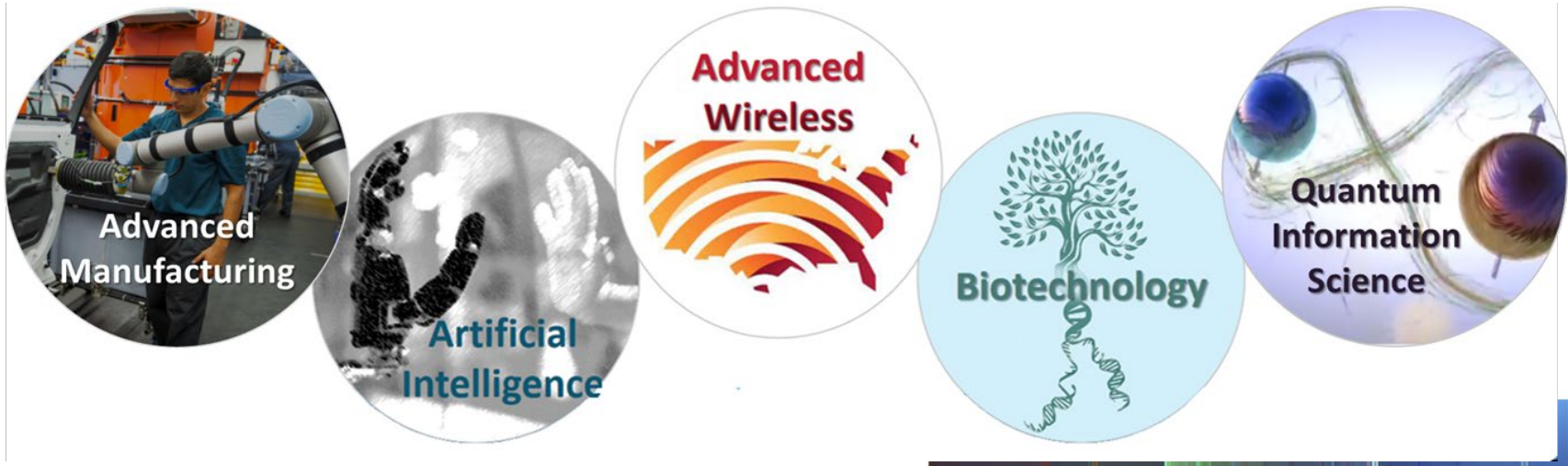
Tackling climate change

Catalyze research and innovation in critical and emerging technologies

Innovation for equity

National security and economic resilience

Emerging Technologies Priority Areas Include:



CAS (Critical Aspects of Sustainability): Innovative Solutions to Climate Change

https://www.nsf.gov/pubs/2021/nsf21124/nsf21124.jsp?org=NSF

cas@nsf.gov

CHE Office Hours

December 3, 2021

Put your questions into “Chat"

What is CAS: Innovative Solutions to Climate Change?

It is a "Dear Colleague Letter (DCL)"

– encourages submissions to existing programs

Focusing on solutions: Mitigation* and Adaptation

1. Reduction of greenhouse gas (GHG) emissions and energy use
2. Energy innovations
3. GHG Sequestration and Removal
4. Climate Change Adaptation
5. Synergistic Topics

** Mitigation: efforts to reduce the amount and speed of future climate change by limiting emissions or removing carbon dioxide from the atmosphere https://www.globalchange.gov/*

CHE Interest Examples in CAS-Climate

1. Reduce GHG Emissions & Energy
   - Chemical processes that reduce emissions/GHG footprint (CAT, CLP, CTMC)
   - Increased energy efficiency (CAT, CSDM-A, SYN)
   - Green/sustainable chemistry (CAT, CSDM-B, ECS, MSN, SYN)

2. Energy Innovations to Climate Change Mitigation
   - Energy conversion and storage, renewable energy production and storage (CAT, CSDM-A, CSDM-B)

3. Enhance GHG Sequestration
   - Advanced approaches for carbon capture (CLP, CMI, CSDM-A, CSDM-B, MSN)

4. Climate Change Adaptation

5. Synergistic Topics
   - Measurement and modeling (CMI, CSDM-A, CTMC)
   - Other (CCI, MRI)
   - Education and outreach (all, including REU)

Reduction of Climate-Impacting Emissions

Elimination or minimization of GHG-generating sources:

- More efficient chemical/polymer manufacturing (energy efficiency, raw material consumption)
- New processes to replace those with significant climate impact
- Green/sustainable chemistry
- Utilization of renewable energy
- Illustrative (by no means limiting!) examples: catalysis, renewable carbon sources, nitrogen fixation, electrochemistry

Energy Innovations to Climate Change Mitigation

- Energy solution to reduce reliance on fossil fuel
- Batteries suitable for large scale energy storage with high energy density. Flow battery, sodium ion battery, electrolyte, electrode
- Solar research. Photovoltaics, Artificial Photosynthesis
- Hydrogen generation and storage
- Chemistry or other divisions: innovative solutions that involve fundamental chemistry

Greenhouse Gas Capture and Sequestration

- Binding, absorbing, surface interactions in various substances
- Clathrate hydrates, metal organic frameworks, ionic liquids, environmental solids, porous polymers
- Phase and interfacial properties of complex fluids

Synergy: Measurement and Modeling

Need new and/or better **experimental** and **computational** methods for simultaneously **characterizing highly-complex, heterogeneous** chemical systems across **molecular-to-macroscopic** scales and **slow-to-ultrafast** time scales and **quantifying** their performance.

What is the process for submitting to CAS: Innovative Solutions to Climate Change?

- CAS-Climate proposals must be submitted to existing programs
- Deadlines, rules, etc. for these programs apply (PAPPG, Solicitations)
- Prospective principal investigators must send an email inquiry to cas@nsf.gov prior to submission to ascertain whether the proposal is suitable. Submit research concept outlines (up to 2 pages)
- If you know your Program Director, still write to (or cc:) cas@nsf.gov
- Proposal title should start with "CAS-Climate:"

CHE is currently interested in
- EAGERs and RAISEs (reviewed internally)
- Workshops (should be interdisciplinary)

*Need to discuss with NSF PO first

Important Considerations

- The intent of this DCL is to support **innovative solutions to climate-change related problems**. Fundamental science advances are needed to achieve these solutions, but for the purposes of this DCL are not an end in and of themselves. Projects of the latter nature continue to be supported by our regular programs.
- The Project Description should discuss, and directly connect, the climate-change related problem the project addresses, **contextualization/benchmarking of the project goals relative to the current state of the science and technology relevant to this climate problem**, the ultimate goals required for its solution, and how the proposed project, if successful, will **provide the science advances needed to achieve this end.**
- The Project Description should also include, as applicable, consideration of issues related to consequences and viability of the proposed solution as well as demonstrating an appreciation for long-term environmental outcomes, scale, net energy and mass balances (e.g., stoichiometry), etc.

Where to Begin

CHE is currently interested in
- EAGERs and RAISEs (reviewed internally)
- Workshops (should be interdisciplinary)

- Define key problems
- Convey how fundamental ideas will enable innovative solutions to climate change
- Think about climate change solutions creatively and seriously
- Address how the new idea is relevant to climate change solutions
- Articulate a roadmap to answer questions
- Define metrics and criteria indicative of success
- Include convincing discussion of intellectual merits **and** broader impacts

Questions?

- Please raise hand or put them in the chat

- Slides will be shared with participants

If you are interested in submitting, please contact a CHE Program Director *and* cas@nsf.gov

For more information: NSF CHE @ https://www.nsf.gov/div/index.jsp?div=CHE

We challenge YOU to create new out-of-the-box science

Next CHE Office Hour

Time: January 14, 2022, 4 PM – 5 PM EST

Topic: NSF/CHE Rotator Program (https://beta.nsf.gov/careers/rotator-programs)

Submit general office hour questions to: cheminfo@nsf.gov

Send requests to be included in our Chemistry Comm Biweekly Emails to: chem-comm@listserv.nsf.gov