



Gr-ResQ

Graphene Recipes for Synthesis of High Quality Materials

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The Team Today



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The agenda



All registered attendees must have access to the Gr-ResQ tool for submission of synthesis data. You can open the tool using the link <https://nanohub.org/tools/gresq>. The agenda:

1. Issues with graphene manufacturing and need for a crowd-sourced database
2. Gr-ResQ – Introduction and Framework
3. Gr-ResQ training
 1. Submit tool
 2. Query tool
 3. Image post-processing tool
 4. Raman fitting tool
4. An example of machine learning model developed
5. Gr-ResQ and beyond

2-dimensional sheet of sp^2 carbon atoms

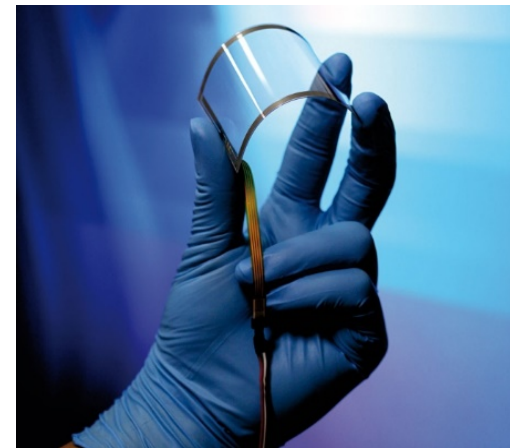
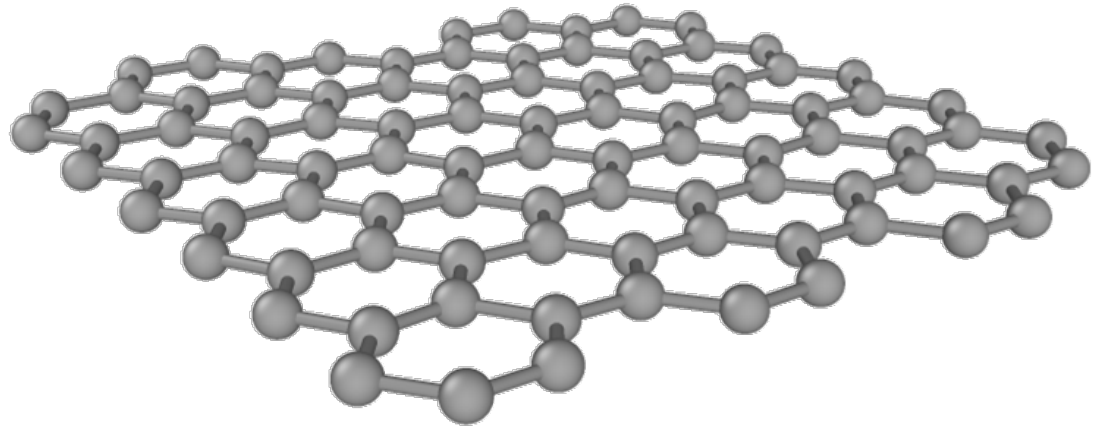
“Honeycomb” lattice

Properties

- High strength
- Electrically conductive
- Flexible
- Heterostructure properties:
superconductivity, magnetism

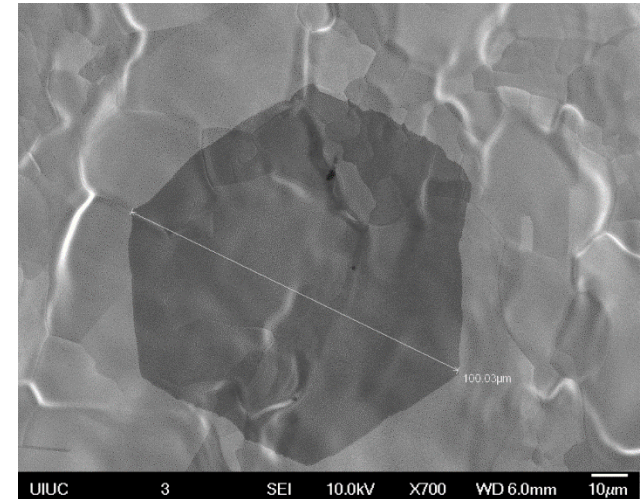
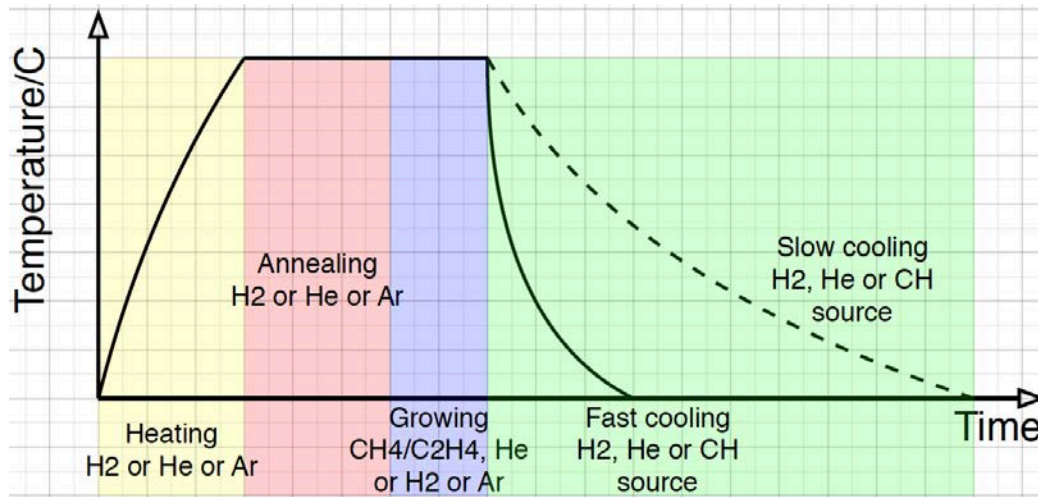
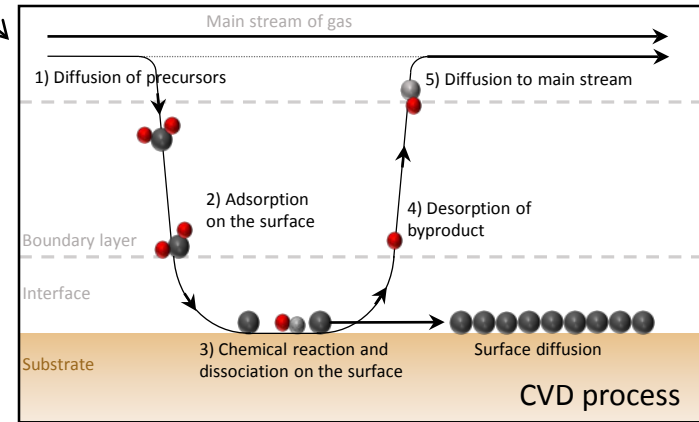
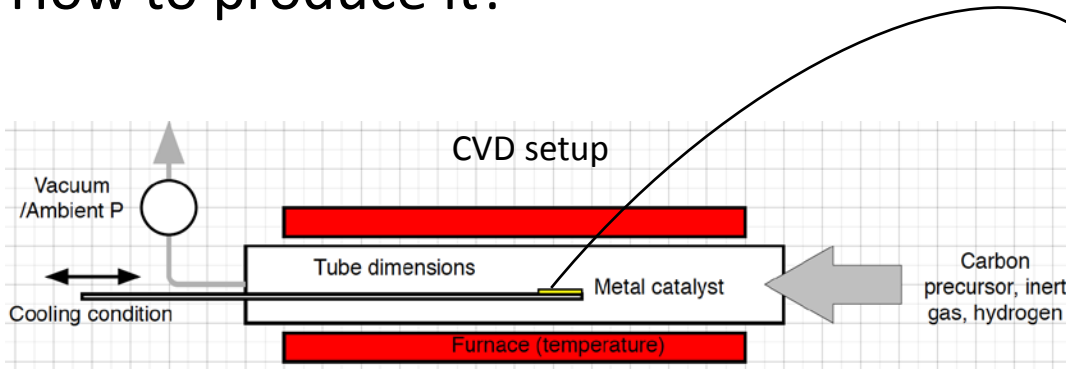
Applications

- Transparent conductor
- Sensors
- Flexible electronics



<https://www.nature.com/news/graphene-the-quest-for-supercarbon-1.14193>

How to produce it?





CVD – Variables and challenges

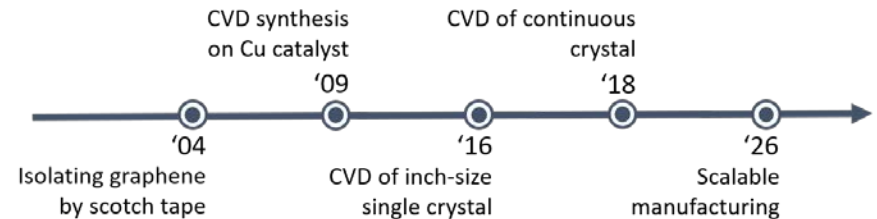
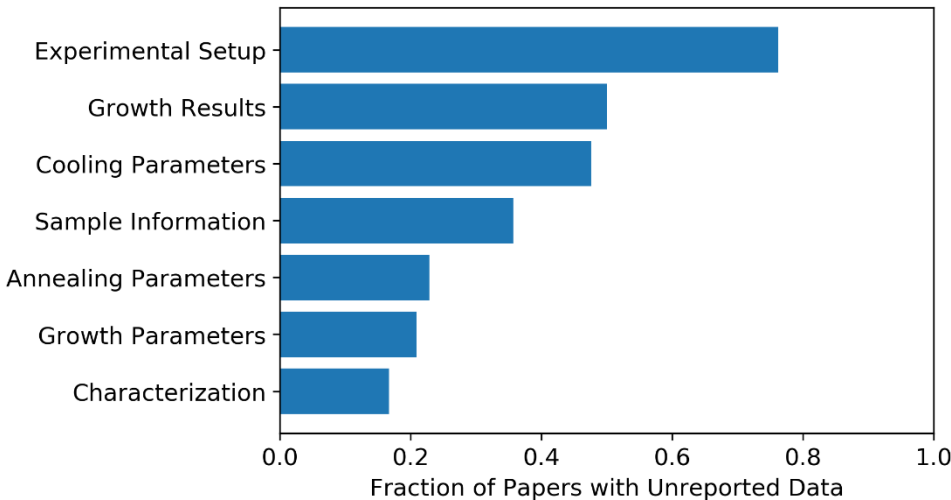


Over 200 variables per sample

- Furnace temperature
- Furnace pressure
- Gas flow
- Sample position
- Annealing condition
- Growing condition
- Cooling condition
- Sample preparation
- Catalyst
- Furnace dimensions

~ 1500 graphene synthesis articles/year

- Poor repeatability of experiments
- Literature lacking description of the parameter space
- Need for centralized database of existing experimental data



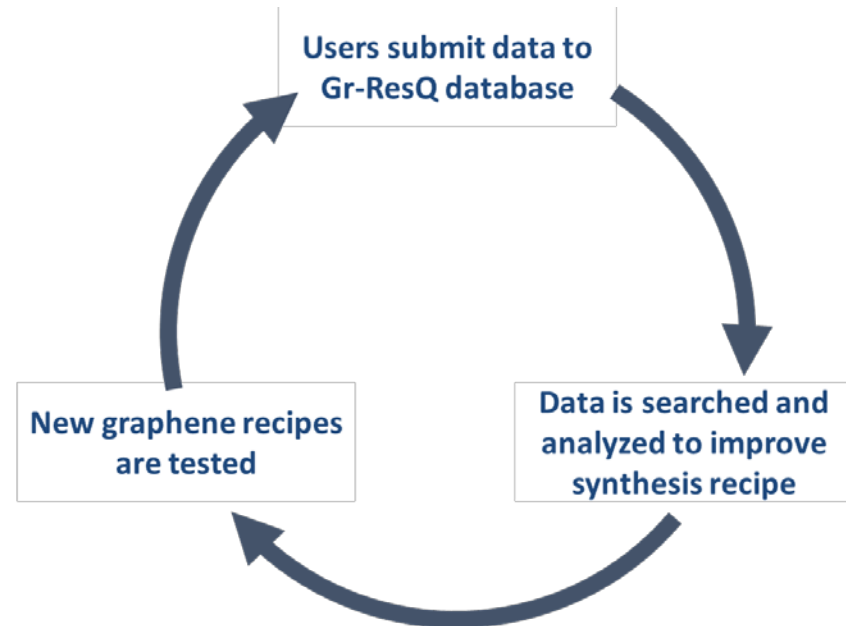
→ **Solution: Gr-ResQ**

(pronounced graphene rescue)

Graphene Resipes for synthesis of high Quality materials

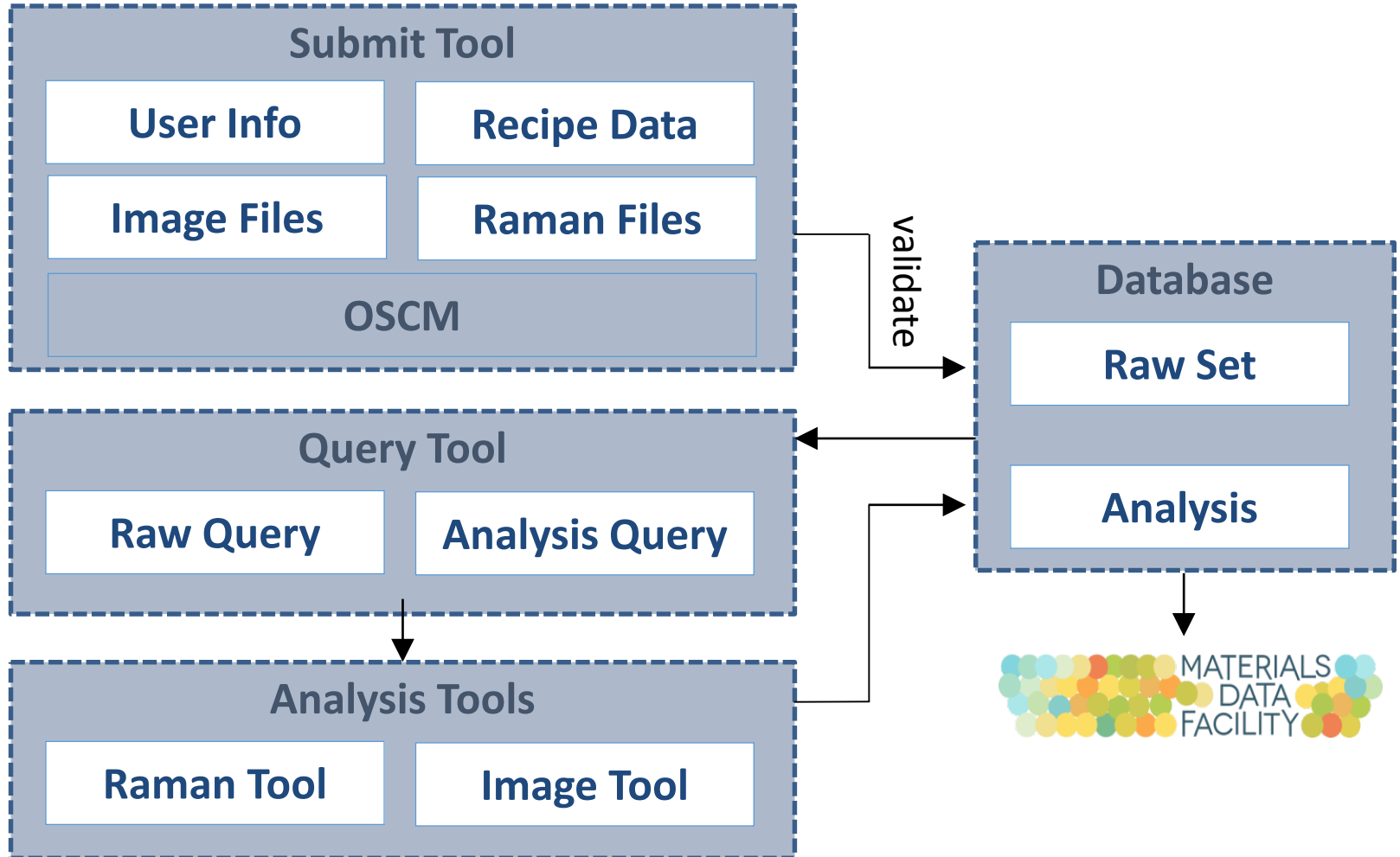


1. Database & Search engine
2. Suite of analysis tools
3. Collaborative Research

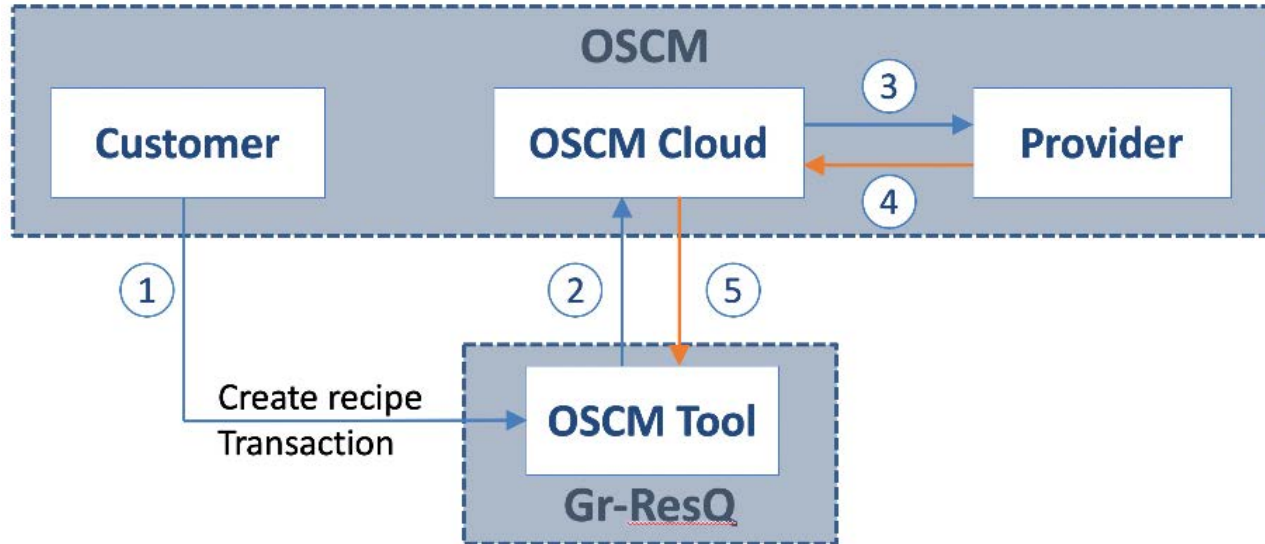




Gr-ResQ



Operation system for cyber-physical manufacturing





Links to the tools



- Gr-ResQ - <https://nanohub.org/tools/gresq>
- SEM Image Processing - <https://nanohub.org/tools/gsaimage>
- Graphene Raman fitting - <https://nanohub.org/tools/graft>

Link to the publication: ["Crowd-Sourced Data and Analysis Tools for Advancing the Chemical Vapor Deposition of Graphene: Implications for Manufacturing." ACS Applied Nano Materials 3.10 \(2020\): 10144-10155](#)