CORNING

Beamline – a Useful & Must Have (?) Tool for Industrial Material Science Development

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About Corning

A global company with 160 years of innovation history

My Career Path

1997 Ph.D. in Solid State Physics, Institute of Physics, Chinese Academy of Science.

1997-1999: 1st post doctor, National Institute for Materials Science, Japan

1999-2001: 2nd post doctor, Kansa State University

2001-2007: 1st industrial job, analytical scientist, Delphi Catalyst, Tulsa, OK

2007-2011: 2nd industrial job, XRD/XRF scientist, Dow Chemical, Midland, MI

2011-current: 3rd industrial job, XRD scientist, Corning Inc., Corning, NY

My 1st National Lab User Experience

ORNL-HTML User program

OAK RIDGE National Laboratory

Best program ever for a budget tight post doc!

Unfortunately…

The High Temperature Materials Laboratory (HTML) User Program is on hiatus due to federal budget reductions. However, research projects at the HTML still may be conducted on a cost-recovery basis through the Work for Others (WFO) Program or under a Cooperative R&D Agreement (CRADA).

My 1st Beamline Experience

APS- 5 DND-CAT

DND Collaborative Access Team
Synchrotron Research Center

- Free ride provided by the XRD predecessors of Dow Chemical.
- No worry about budget and legal issue, just go and do!
- Application on XRD, SAXS, XAFS.
- Convinced and devoted to beamline!

My 2nd Beamline Experience

Devoted to synchrotron, the opportunity finally came a year after joining Corning…

BROOKHAVEN NATIONAL LABORATORY

- Obtained budget is just the 1st step…
- Headache legal process: NDA, Proprietary user agreement, WFO…
- Payment process: supplier account set up, pre-payment…
- Finally it is the fun time: beam time started!!!

Application: PDF Analysis of Nanoporous Carbon

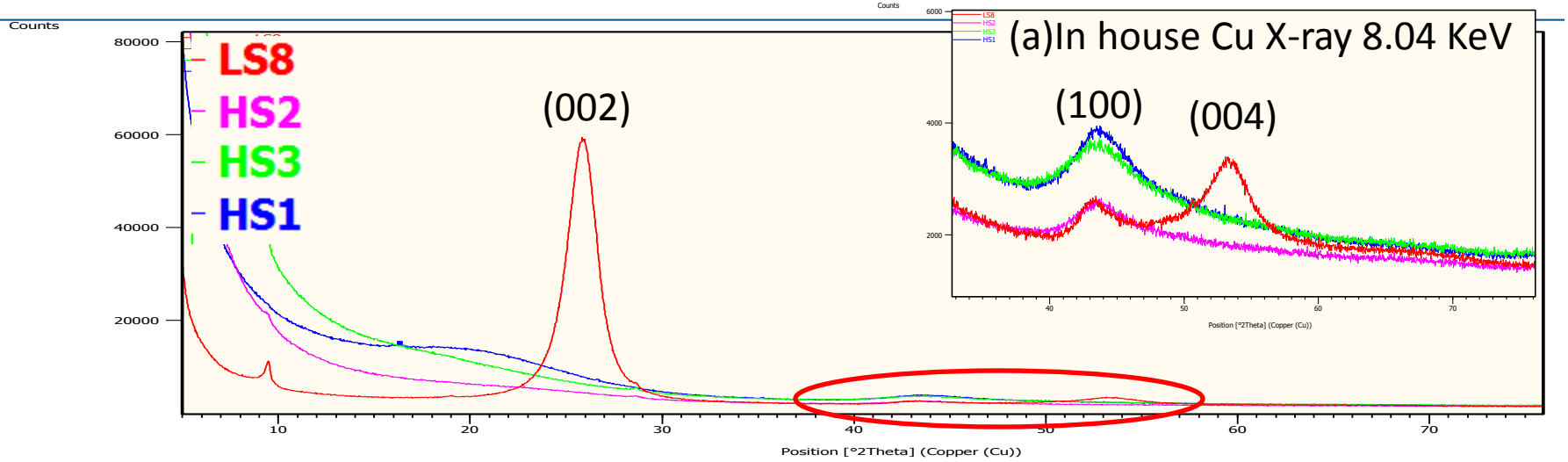
Two major attractive:
1. High surface area;
2. Nano sized pores.

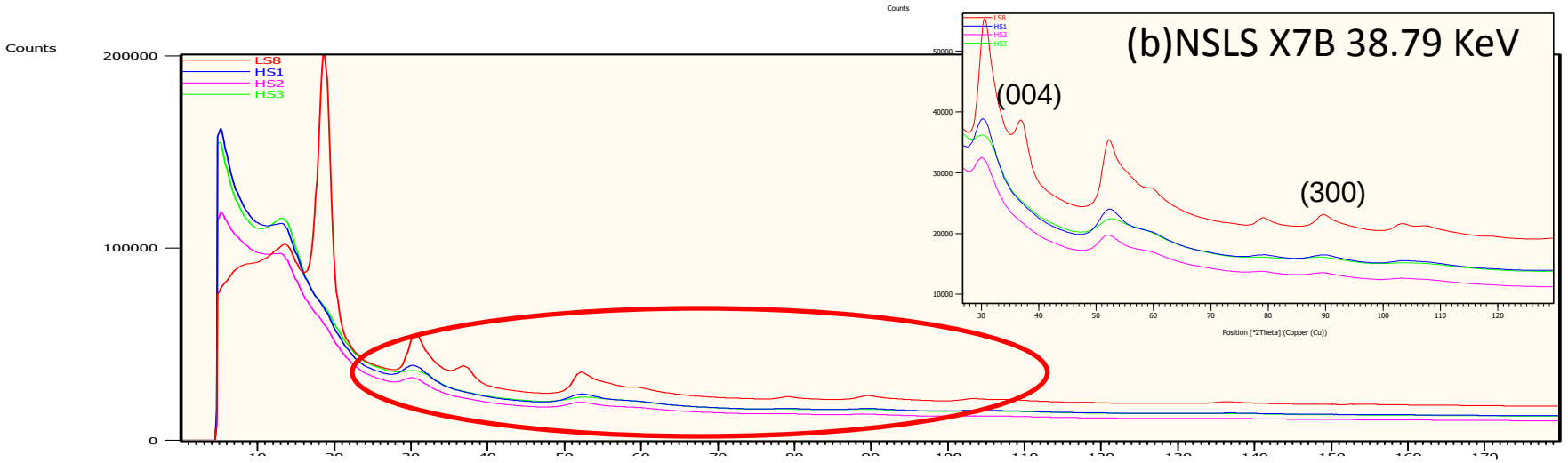
Applications:
1. Hydrogen & natural gas storage;
2. Anode for rechargeable battery;
3. Ultracapacitor.

Two step synthesis:
1. Carbonization at N_2.
2. Activation: chemical or physical method.

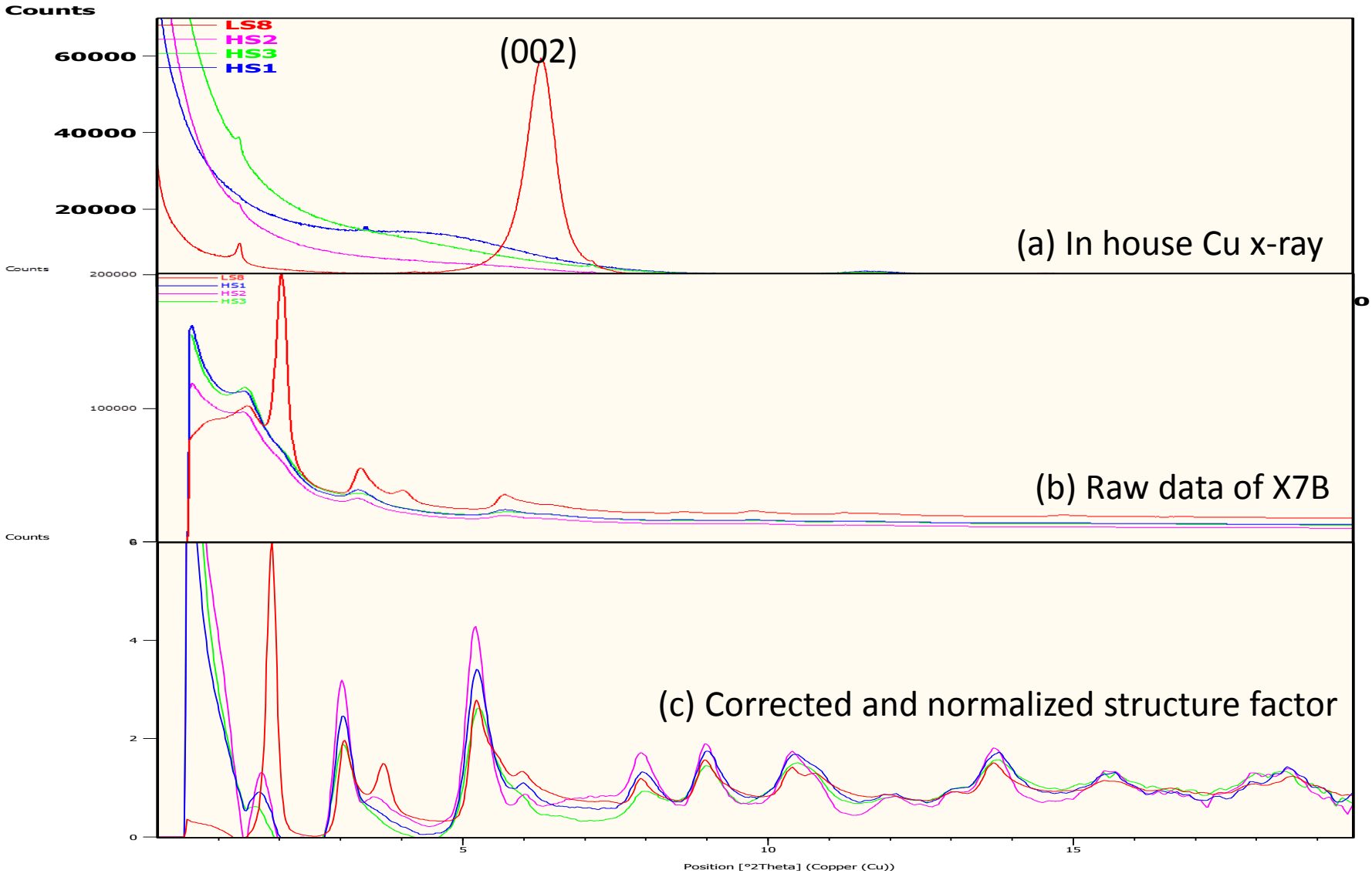
Performance:
1. Capacity: macro properties (surface area & pore size distribution);
2. Lifetime: stability (local structure).

Comparison between in house and Synchrotron

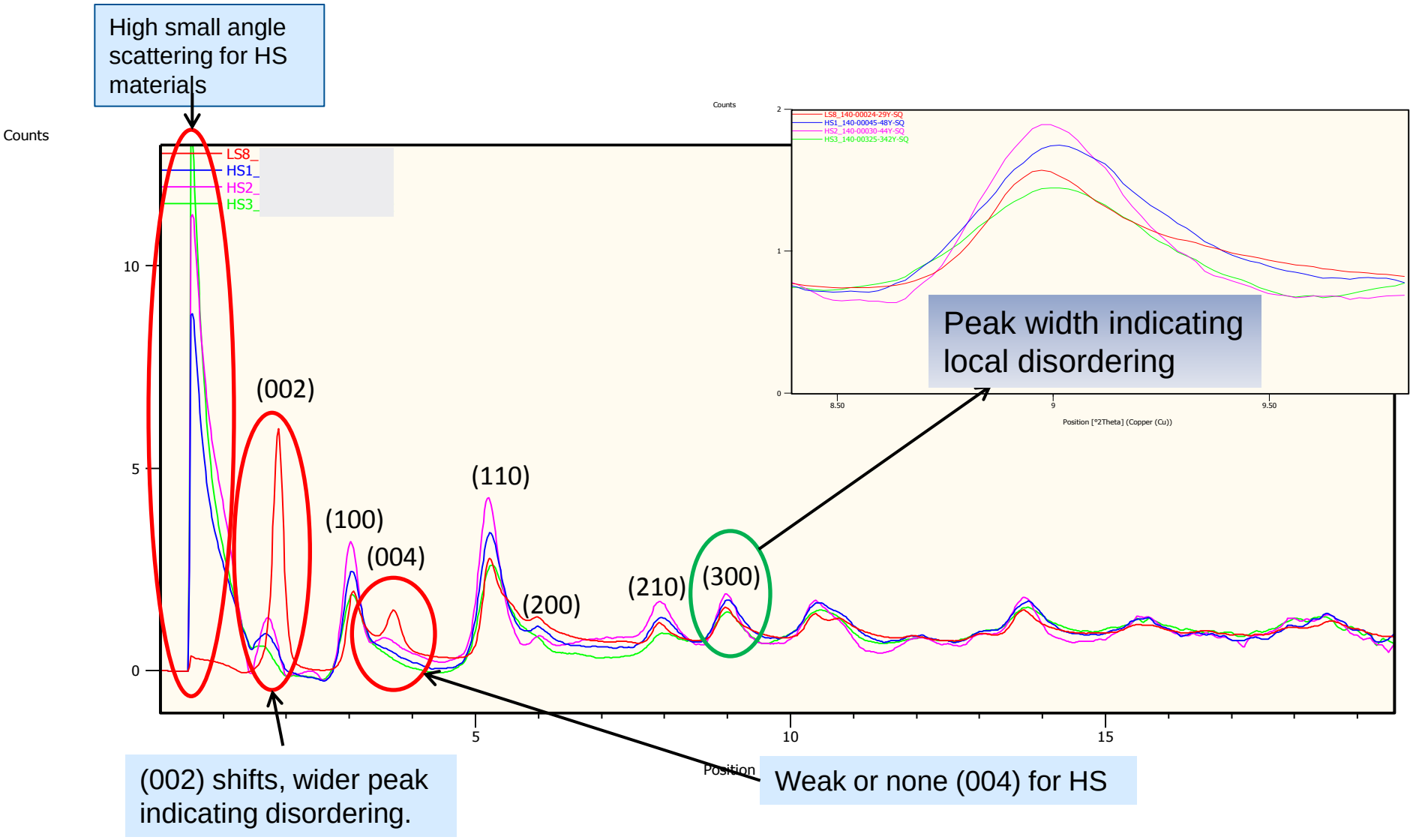




Data Getting Better After Correction



Diffraction Pattern of Represented Samples



Other Beamlines Approach

CHESS-A2

Cornell University
Cornell High Energy Synchrotron Source

LNSC, LANL

LANSCE
LUJAN CENTER
Los Alamos National Laboratory

APS

Expectation of a Convinced User

- On-time delivery: guaranteed beamtime every cycle with possible make up time.
- Mail-in service !!!
- Error-proof set up to ensure the quality of measurements: incident beam monitor, better sample alignment system…
- Support: not only measurement, but also analysis.
- More flexible for payments.
- Better accommodation: room & dinning.

Attract New Users:

- No direct incentive for industrial user to initiate the program under the current R&D environment.
- Outreach to the potential users – conference, word of mouth, a referral system…
- Free beamtime offer for the first time user: 1st visit must be productive for the returning visits.
- Simplified legal process: accept industrial template or standardized all national labs.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