

Process Optimization for Scale-Up

Statement of Need

The client needed a process for preparing gold nanorods by seed-mediated growth, to yield a reliable nanorod size and optical absorption, that could be reproduced on a larger scale.

Raybow USA Responses

- Reproduced the established procedure.
- Examined different reaction conditions.
- Identified the critical parameters for repeatable results.
- Scaled up in a stepwise fashion to a pilot-like scale of 30L.
- Conducted purification via dialysis and centrifugation.

Scope of Lab Work

- Process development
- Process optimization
- Synthesis
- Analysis
- Production

Outcome Summary

- ✓ **Developed Process and Analytics**
Our actions assured the client that their product could be reliably manufactured.
- ✓ **Generated Consistent Results**
We controlled the diagnostic UV peak within the desired range.
- ✓ **Prepared Product for Scale-Up**
We demonstrated a large-scale process that could support predicted future needs.
- ✓ **Met Client's Timeline Needs**
We provided results within the client's deadlines for their next steps.

Process Timeline

- **May 2023** - Raybow USA initiated the quote process.
- **July 2023** - Raybow and the client finalized quote terms.
- **December 2023** - Client delivered their Purchase Order to Raybow.
- **January & February 2024** - Raybow chemists developed process optimization.
- **February 2024** - Raybow produced demonstration scale at 300mL, 3L, & 30L.
- **July 2024** - Client contracted with Raybow to use material in next phase.
- **October 2025** - Prepared manuscript highlighting process refinements' utility.
- **February 2026** - Published in "Journal of Industrial and Engineering Chemistry."

Link to journal article: <https://www.sciencedirect.com/science/article/pii/S1226086X26000481>



Ownership

All IP belongs to the client. Including refinements.

Fluid Interactions

Interactions are key to project success. We employed multiple methods to achieve the client's project goals, to keep the client informed of progress and results, and to receive feedback and direction from the client.

- **Virtual Meetings**
- **Phone Calls**
- **Emails**
- **Shipping**
- **Secure Electronic Document Sharing**

Guiding Professional Concepts

- ✓ **Dedication:** We allocated time, equipment and human resources to ensure all client needs could be met in a timely fashion.
- ✓ **Knowledge:** We drew upon our team's education and experiences to fine-tune protocols to deliver the highest quality data.
- ✓ **Responsiveness:** We listened to the client's needs and determined an action plan to meet their goals and deadline.
- ✓ **Attention:** We applied best established practices to ensure quality and accuracy throughout the project.

Start the conversation about your project today.



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