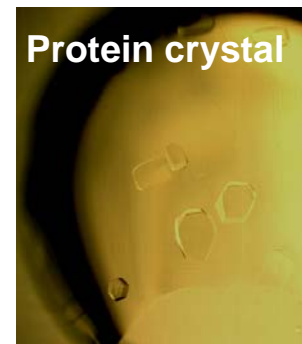


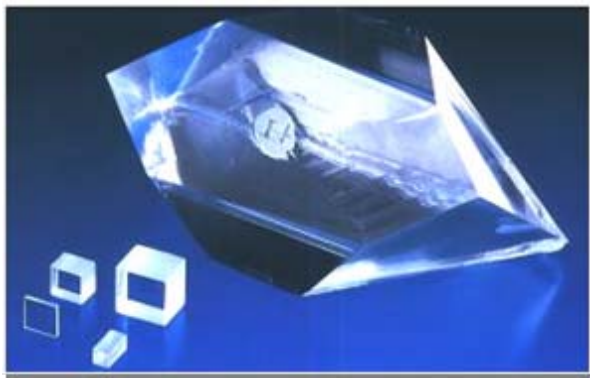
From Technology Development and Transfer of Nonlinear Optical Crystal, **to** Interdisciplinary Collaboration to Start-up of a Venture Business of Crystallization of Protein

非線形光学結晶CLBOの発見と産学連携・技術移転から
異分野連携によるタンパク質結晶化ベンチャーへの展開

Y. Mori, Osaka Univ. 大阪大学 森勇介



CLBO & Applications of UV laser CLBOと紫外レーザー応用

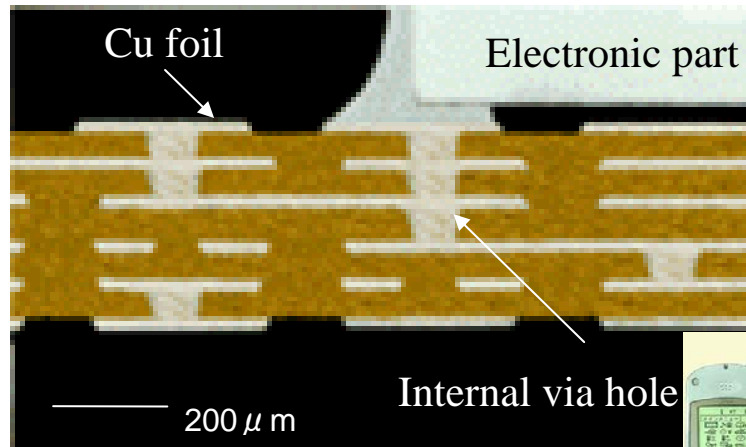


Discovery of CLBO in 1993

CLBO has best NLO properties for UV light generation by frequency conversion process.

1993年に非線形光学結晶CLBOを発見
最も優れた波長変換による紫外光発生特性

Hole-drilling for multi-layer circuit board
プリント基板レーザー加工 266, 213 nm



プリント基板を用いた製品

Products with multi-layer circuit board :

Semiconductor Mask inspection <200 nm
半導体マスク検査

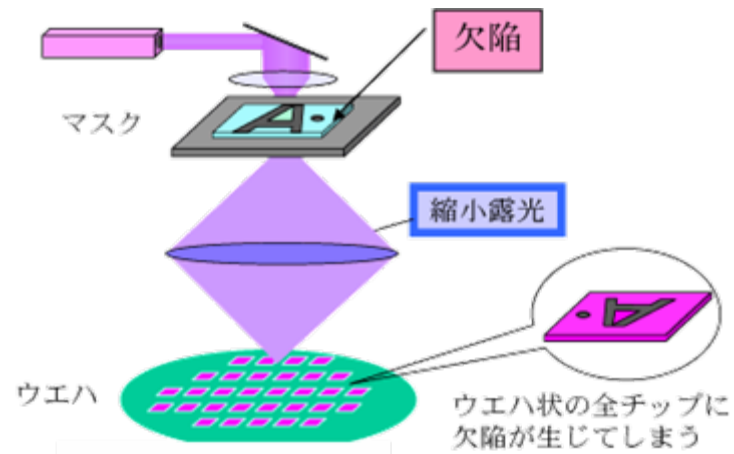
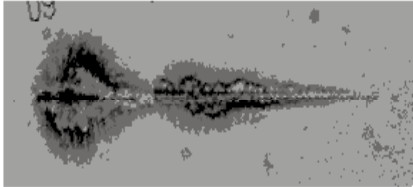


図1 マスク欠陥の影響

Advanced Photon Processing & Measurement Technologies

NEDO Project: 1997~2001

Problem



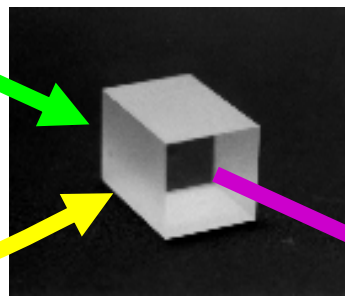
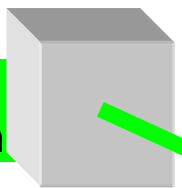
Laser-induced damages

develop high-quality CLBO with high resistance to laser damages ⇒ New crystal growth technology



Mitsubishi Electronic Co. high-power Nd:YAG laser

Green laser wavelength: 532nm



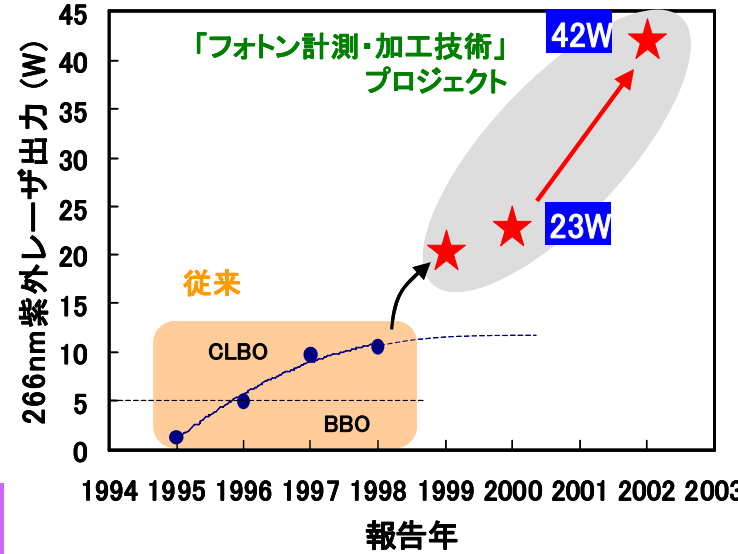
Osaka University high quality CLBO crystal



CLBO

UV laser wavelength: 266nm

New Crystal Growth Tech. Solution Stirring (溶液攪拌法)



266nm UV laser output World champion data : 42W

Technology Transfer of CLBO to Oxide Corp.

Oxide Corp., a spin-off from NIMS, has started to grow high-quality **CLBO** based on the technology of Osaka Univ.

旧無機材質研究所からのスピンオフベンチャーであるオキサイドが大阪大学が開発した溶液攪拌法の技術移転を受け高品質**CLBO** 結晶育成を開始

New Challenge: After successful technology transfer of **CLBO**, Osaka-U embarked on the challenge on a new research topic, **crystal growth of protein.**

新展開：**CLBO**結晶後、大阪大学では新しい研究テーマとしてタンパク質結晶化技術の研究開発を開始

" High-Quality CLBO from Oxide "

promising high performance UV lasers for various applications

Oxide Corporation starts to grow large-size, high-quality CsLiB₆O₁₀ crystals by using innovative technologies under license from Osaka Univ.



- Superior harmonic generator in UV region (4HG & 5HG of Nd:YAG, Shortest SHG :237nm)
- High bulk laser damage threshold (>1.7 times higher than fused quartz @266nm)
- Large d coefficient: d₃₆(532nm)=0.92pm/V
- Wide transparent range: 180~2750nm)

Oxide Corporation

9633 Kobuchisawa Kitakoma,
Yamanashi, 408-0044 JAPAN

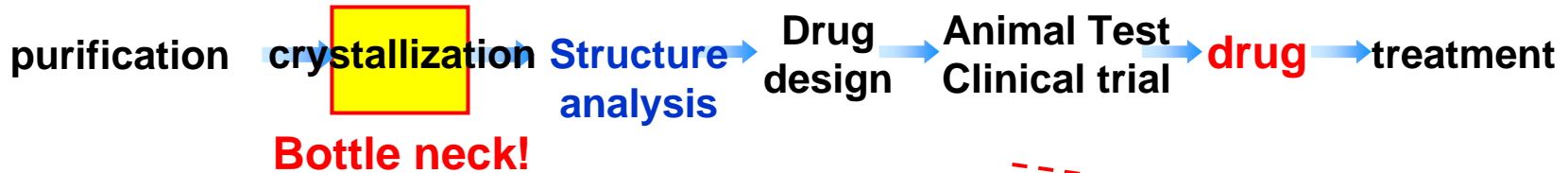
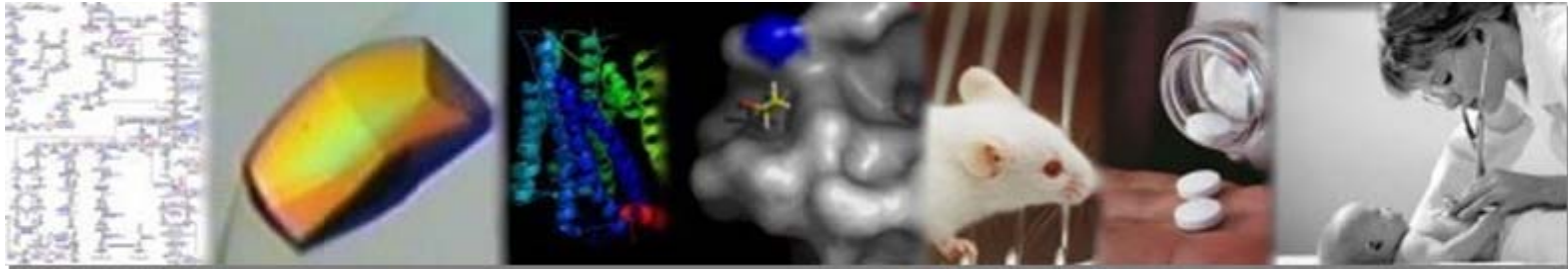
Phone: +81 551 20 5353 Fax: +81 551 20 5355

E-mail: furukawa@opt-oxide.com

www.opt-oxide.com

Protein Crystal for Structure-Based Drug Design

タンパク質結晶は立体構造を基にした創薬に必要



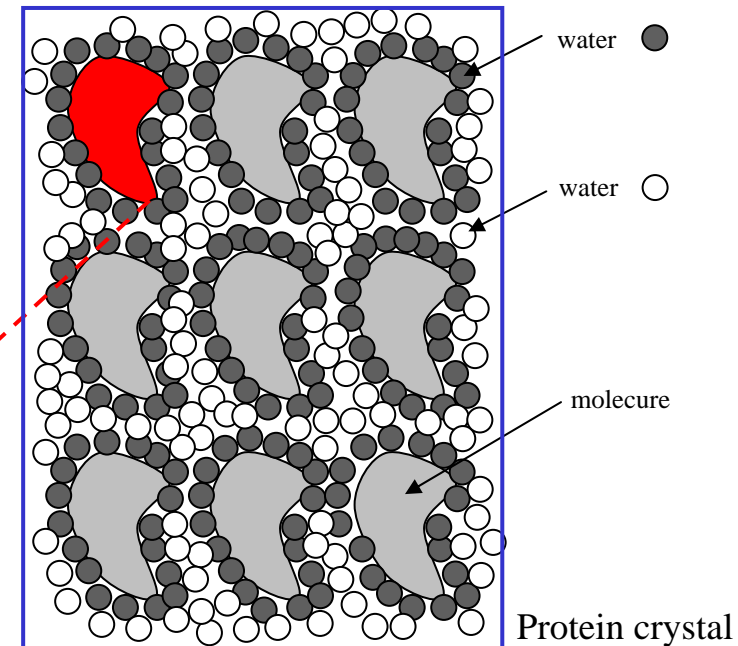
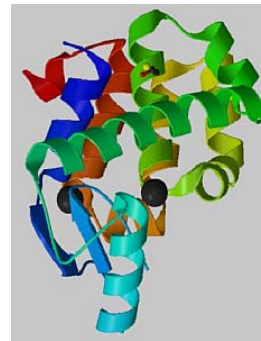
Precise structure determination
Essential for drug discovery
高精度構造情報が創薬には不可欠

⇒ High quality crystal (高品質結晶が必要)

Protein crystal growth

⇒ **difficult**

タンパク質結晶育成は極めて困難



Interdisciplinary collaboration induced break through 異分野連携により新技術開発



Strong CLBO device against laser damage
レーザー損傷耐性の優れたCLBO波長変換素子

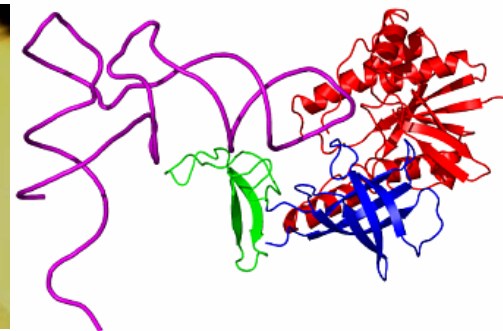
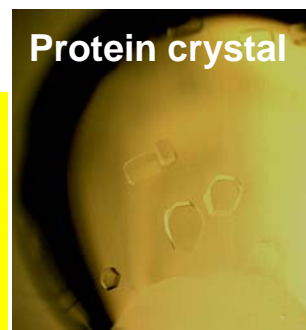
New Crystal Growth Tech.
Solution stirring (溶液攪拌法)



First all solid-state 193 nm laser

Transfer this technology to protein crystallization by
interdisciplinary collaboration at Osaka Univ.
(Laser Researcher & Protein Researcher)

New protein crystal growth method
Solution stirring & Laser nucleation
Success rate **20% (conventional) → 70%**
結晶化成功確率が**20%から70%**に向上



First structure analysis of tRNA and MnmA complex
Acta Cryst. F62 (2006) 368, Nature 442 (2006) 419



Osaka Univ. Venture company: SOSHO, Inc.

Venture company: SOSHO Inc.



Established: July 1, 2005

Head Office: In down town Osaka

Laboratory: In Osaka Univ.

Representative Director: Hiroaki ADACHI, Yusuke MORI

Capital: 55M JPY

Employees: 8

Business contents: Crystallization service of proteins & small molecules (drug candidate)



Request for crystallization of proteins & small molecules

Pharmaceutical Co., Chem/Food Co.

Conclusion

How to bring seeds of University to practical application

(1) Large market requiring capital investment, quality control, inventory control

⇒ Technology Transfer by the Collaboration between University and Industry

(2) Niche market not requiring capital investment, and technology can be on its own

⇒ Start-up of Venture Company

Other important point ⇒ Mental training

To improve communication ability, creativity, challenge spirit