



LifeSensors' technology: Enhancing recombinant protein expression with SUMO



SUMO expression platform

- Fusion to SUMO enhances recombinant protein expression, especially hard to express proteins, in:
 - *Escherichia coli*
 - Yeast (*Saccharomyces*, *Pichia*)
 - Insect cell/baculovirus system
 - Mammalian cells (CHO, HEK293)
- Digestion with specific desumoylase releases protein with the desired NH₂-terminus
 - Tertiary structure recognition eliminates cleavage in protein of interest (POI)



Benefits of the SUMO platform

Problem

Low yield

Specific N-terminus
required

Insolubility

High cost of goods



Solution

SUMO-enhanced
expression

SUMO-specific processing

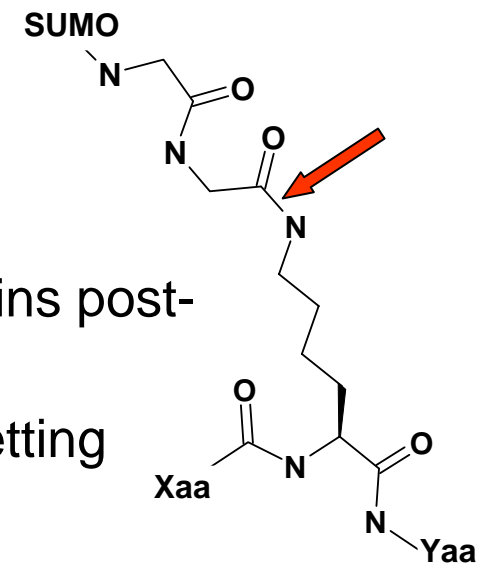
SUMO-driven folding

SUMO-affinity
purification



What is SUMO

- SUMO, or Small Ubiqutin-like modifier, is a member of the ubiquitin family
 - Includes SUMO, aka smt3, of yeast
 - huSUMO1, huSUMO2/3, and huSUMO4
 - NEDD8, ISG15, etc.
- Like ubiquitin, SUMO is attached to target proteins post-translationally through an isopeptide bond
- Unlike ubiquitin, SUMO is **not involved** in targeting proteins for degradation
- SUMO is **involved** in intracellular trafficking, especially to the nucleus



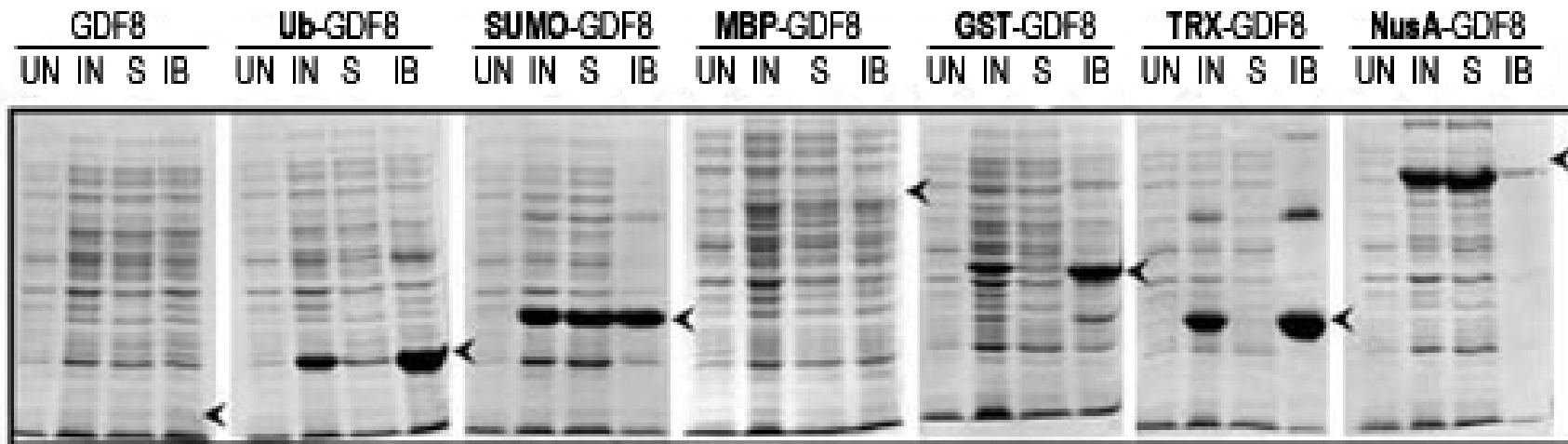


SUMO proteases

- Intracellular cysteinyl-proteases
- Involved in:
 - maturation of SUMO precursor
 - deconjugation of SUMO
- Recognize the Gly-Gly sequence at the C-terminus of SUMO
- Recognize tertiary structure of SUMO
- Result: highly specific processing
- SUMO and deSUMOylases found in all eukaryotes



SUMOpro[®] fusion enhances expression and solubility in *E. coli*



CONDITIONS

UN – Uninduced

IN – Induced

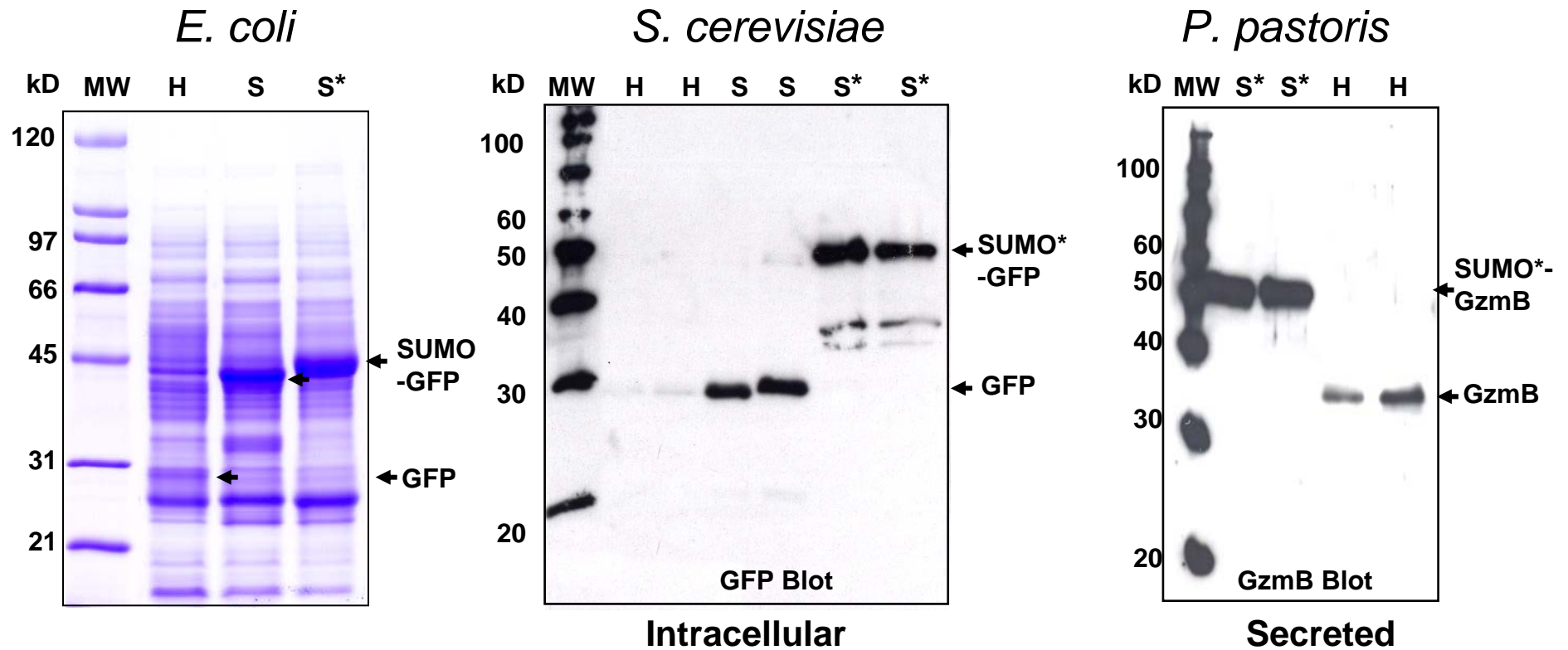
S – Soluble Fraction

IB – Inclusion Bodies

Marblestone et. al., Protein Sci. 2006 Jan;15(1):182-9



SUMOstar™ enhances expression and solubility in yeast



H – His₆
S – His₆-SUMO
S* – His₆-SUMOstar



LifeSensors' products and services overview

Established Products

- SUMOpro[®] (*E. coli*) Expression Kits and Vectors
- SUMOstar[™] Expression Kits and Vectors
 - Vector, Antibody, Protease, Control Protein
 - *E. coli*, Yeast, Insect, and Mammalian
 - SUMOstar[™] Protease
- CHOP-Reporter[™] Kits for assaying isopeptidases (five kits)

New Products

- Ligation-independent cloning vectors
- Affinity purified, highly-specific SUMO and SUMOstar[™] Antibodies
- SUMO3[®] (*P. pastoris*) Expression Kits
- Active deubiquitinating enzymes (DUbs)
- Specific antibodies to DUbs

Services

- Custom Protein Production Services
- Custom Discounts for Large Protease Orders



New Product Development

- **New fusion partners**
 - Enhance protein expression, solubility, purification
 - New SUMO tag development and testing
- **New protein purification options**
 - Affinity resins
 - Immobilized proteases
- **Antibodies and proteins**
 - UBL-protein antibodies (detection and assay development)
 - Active deubiquitinases and deSUMOylases
- **Biomarker discovery arrays**
- **Novel DUb substrates**



LifeSensors Mission

- **Vision:** To be the world leader in UbL technologies
 - Ubiquitin and ubiquitin-like proteins
 - Ub
 - SUMO
 - ISG15
 - NEDD8
- **Objective:** Develop and market products for research, therapeutic, and diagnostic markets.



About LifeSensors

- Founded in 1996
- Located 35 miles west of Philadelphia
- Pioneer in the use of SUMO-based expression systems
 - Industry standards for expression of research, diagnostic, and therapeutic proteins
- Over ten issued patents or applications covering the technology
- Customers include:
 - Governmental agencies
 - Large and small pharmaceutical companies
 - Biotechnology companies
 - Universities and research institutes