

# SUMO Protein Expression Platform

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# LifeSensors

- Leading Biotech in UPS Drug Discovery and Diagnostic R&D
- ~500 Products, Proteins, Ubiquitin Affinity Reagents (TUBEs), Inhibitors, Assays, Kits and Proprietary Protein Expression Systems (SUMO)
- Drug Discovery, UPS and PROTAC Screening Services
- Profiling Compounds Against Ubiquitin Ligases and DUBs
- Custom Assay Development and Collaborative Research

# Benefits of the SUMO Platform

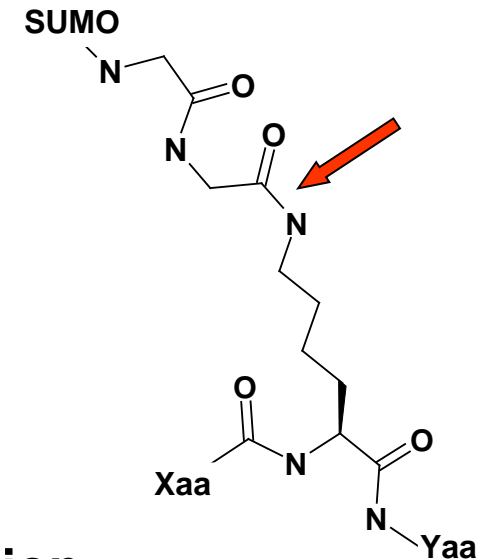
Problem
Low yield
Specific N-terminus required
Insolubility
High cost of goods



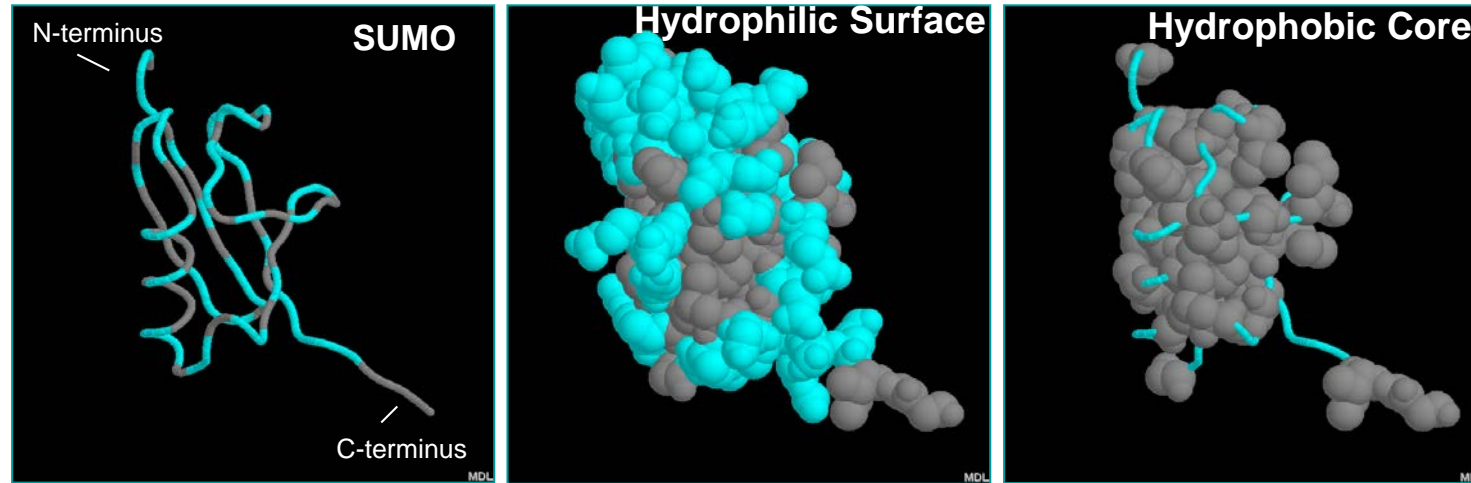
Solution
SUMO-enhanced expression
SUMO-specific processing
SUMO-driven folding
SUMO-affinity purification

# What is SUMO?

- **SUMO, or Small Ubiquitin-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**
- **SUMOs highly conserved; processed in all systems**
- **Unlike ubiquitin, SUMO is not involved in targeting proteins for degradation**
- **SUMO is involved in intracellular trafficking, especially to the nucleus**



# How Does SUMO Fusion Enhance Quality and Quantity of Protein?



- **Hydrophilic** surface helps solubility
- Enhances protein expression
- Improves quality of protein
- **Hydrophobic** core facilitates correct folding
- Simple purification procedure
- Removable tag, Small tag

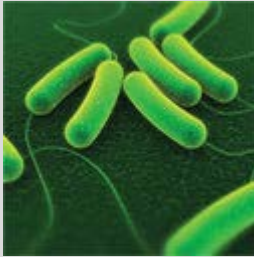
# SUMO Fusion Tag Platform for Enhancing Protein Expression

- Increased yield in multiple expression hosts
- Increased yield + efficient protease cleavage = lower cost of production
- Fusion Tag Protein Expression System
  - Tag: SUMO (small ubiquitin-like modifier)
- Increased expression
  - SUMO protects proteins from degradation
- Increased solubility
  - SUMO helps proteins fold correctly
- Easy Purification
  - Both the tag and the protease have a 6xHis tag
- Native/Active Protein
  - SUMO Protease leaves no unwanted residues on the N-terminus



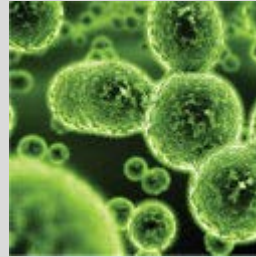
# Expression Systems for Multiple Expression Hosts

## E. Coli



1. SUMOstar
2. SUMOpro3
3. SUMOpro

## Yeast



1. Saccharomyces intracellular SUMOstar
2. Pichia pastoris secretory SUMOstar

## Insect



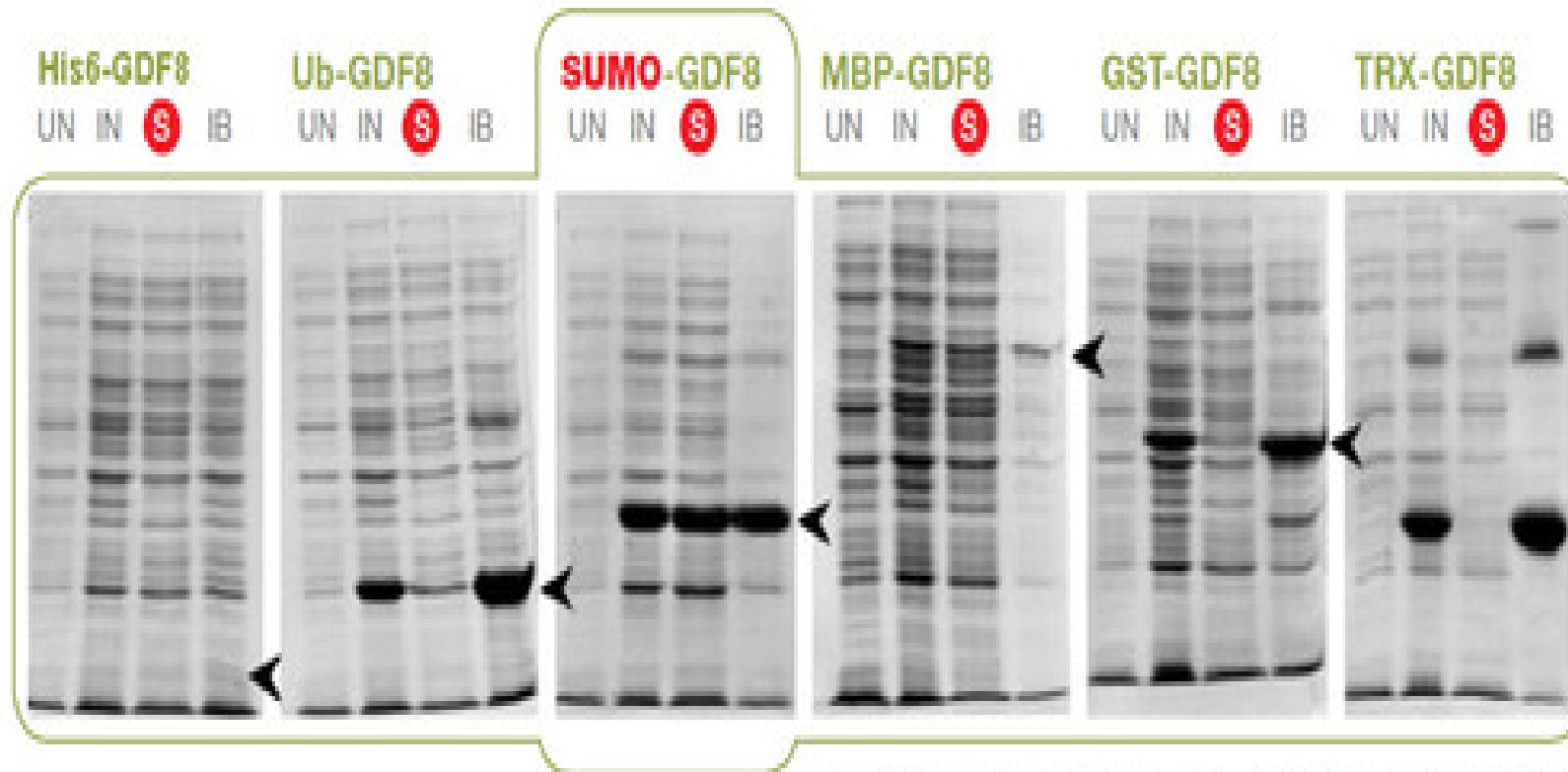
1. Insect intracellular SUMOstar
2. Insect secretory SUMOstar

## Mammalian



1. Mammalian intracellular SUMOstar
2. Mammalian secretory SUMOstar

# 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



# SUMO Proteases

- Intracellular cysteinyl-proteases
- Involved in
  - maturation of SUMO precursor
  - deconjugation of SUMO
- Recognize tertiary structure of SUMO
- Cleaves after the Gly-Gly sequence at the C-terminus of SUMO
- **Highly specific processing**
- SUMO and deSUMOylases found in all eukaryotes

# SUMOpro vs. SUMOstar™

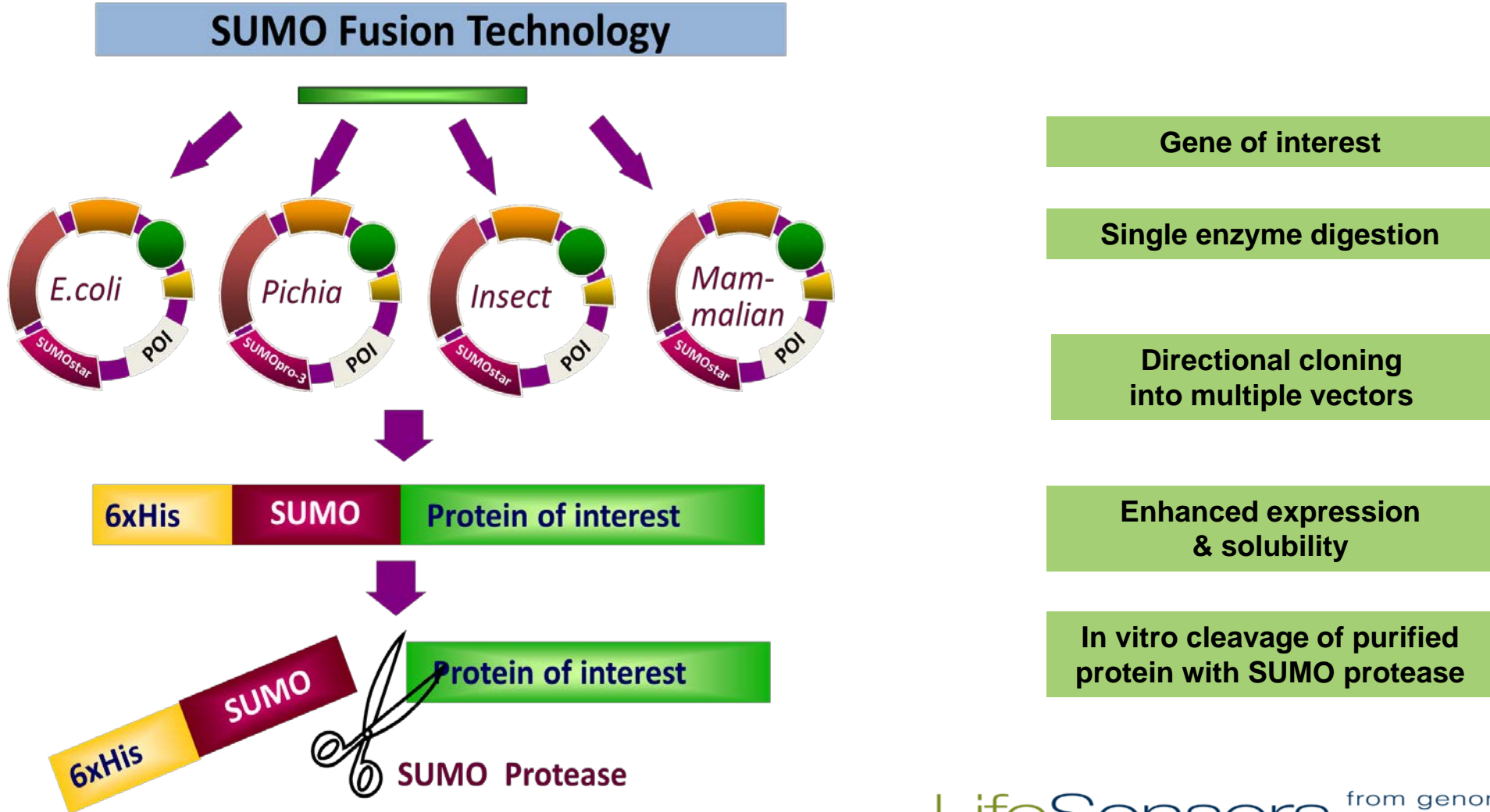
## ➤ SUMOpro

- SUMO expression system to be used in bacteria

## ➤ SUMOstar™

- Extends SUMO benefits to yeast, insect and mammalian systems
- Eukaryotes have endogenous SUMO hydrolases
- SUMOstar™ engineered SUMO and not cleaved in eukaryotic cells by SUMO-hydrolases
- SUMOstar™ protease is also engineered that cleaves SUMOstar™ fusion proteins

# SUMO as a Universal Tag



# Examples of Proteins with Enhanced Expression with SUMO

## ➤ Peptides

Bosse-Doenecke, et al. Prot. Exp. Purif., 2008. 58:114-121.

## ➤ Brazzein, sweet protein from corn

Assadi-Porter, et al. Prot. Exp. Purif., 2008. 58:263-268.

## ➤ Cytokines

Kirkpatrick, et al., Prot. Exp. Purif., 2006. 50(1):102-110.

Sun, et al., Appl Microbiol Biotechnol, 2008. 78:495-502.

## ➤ Chemokines

Lu, et al., Prot. Exp. Purif., 2009. 65:251-260.

## ➤ Viral proteins

Assenberg, et al., Acta Cryst., 2008. F64:258-262.

## ➤ Single chain antibody

Ye, et al., Appl Microbiol Biotechnol, 2008. 81:311-317.

# Contact Us!

We are your partner for Protein Expression & Purification

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