

## Student Talk

### Inter-Disciplinary Explorations in Chemistry (I-DEC 2018)

#### Generation of monomeric and monovalent streptavidin variant through protein engineering for live-cell imaging

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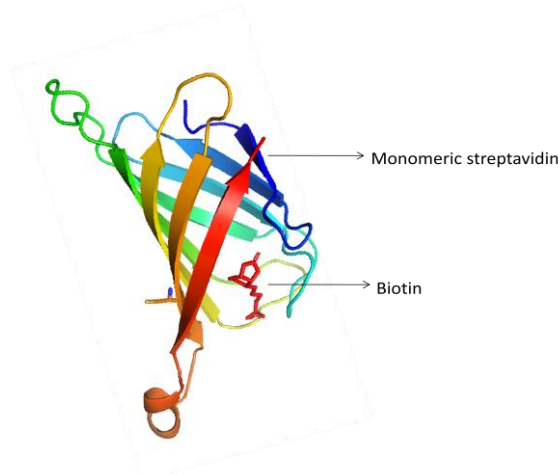
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#### Abstract:

The Streptavidin-Biotin association is one of the strongest non-covalent interactions in nature with a rapid reaction-rate and high specificity.<sup>[1]</sup> Streptavidin is a tetrameric protein which forms a very compact and stable entity with the biotin. In the tetrameric form, it can bind with four biotin molecules together imparting more ordered structure.<sup>[2]</sup> Also, different variants of streptavidin with high or low binding affinity with biotin have been reported till date.<sup>[3]</sup>



**Figure1:** Monomeric streptavidin with single biotin binding site (drawn using PyMOL, PDB code: 1SWE).

However, the tetravalency of streptavidin hinders the application in live-cell imaging as four biotinylated receptors are bound together and interferes with their dynamics. Through protein engineering, we are trying to devise monomeric as well as monovalent streptavidin with a single-biotin binding site. This form of streptavidin engineering would be a potential approach for studying biotinylated targets. This aspect of targeting cellular receptors might act as efficient method to understand molecular dynamics.

In my talk, I would be discussing about the site directed mutagenesis of various amino acids residues at the interface for the development of monomeric and monovalent of streptavidin with similar biotin binding affinity. Later, its conjugation with suitable fluorescent dyes through bio-conjugation for live-cell imaging will be investigated.

#### References and Notes:

- (1) Chivers, C.; Crozat, E.; Chu, C.; Moy, V.; Sherratt, D.; Howarth, M. *Nat Methods*, **2010**, 7(5), 391–393.
- (2) Chivers, C.; Koner, A.L.; Lowe, E. D.; Howarth, M. *Biochem. J.*, **2011**, 435, 55–63.
- (3) Howarth, M.; Chinnapen, D.; Gerrow, K.; Dorrestein, P.; Grandy, M.; Kelleher, N.; Hussein, A.; and Ting, A. *Nat Methods*, **2006**, 3(4), 267–273.

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**Bio-Sketch of Speaker**



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Currently, I am working as a PhD student (Jan. 2015-Present) at Indian Institute of Science Education and Research Bhopal, India, jointly under the supervision of Dr. Apurba Lal Koner and Dr. Vimlesh Kumar. I am a senior research fellow, CSIR.

I have done my Masters from School of Biotechnology, Devi Ahilya University in 2012. My research interest lies in exploring the questions underlying the complex biological events.