

Structure and Dynamics of Intrinsically Disordered Proteins in neurobiology and degeneration

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Research Focus and aim

Intrinsically Disordered Proteins are dynamic and flexible proteins that self-associate into various assembly states and can undergo liquid-liquid phase separation. In our group we are interested in understanding the equilibrium and transition between these protein states, in order to obtain better understanding of their role in health and disease.

Main Research Topics

In the Sahin group we are interested in understanding the fundamental mechanisms of regulatory properties of Intrinsically Disordered Proteins. To understand this we study:

- 1. Proteins relevant for long-term memory formation**
- 2. Proteins playing a crucial role in neurodegeneration, including dementia and ALS.**

Methodologies

We take a biophysics, biochemistry and molecular approach to explain protein behaviour. Using **molecular biology** we design and produce protein from bacteria. We use **biochemistry** assays to explain molecular interactions and states. **Biophysical** approaches are the corner stone in our research group. Here we implement **native mass spectrometry, ion mobility, microscopy and prediction tools** e.g. AlphaFold3 to zoom in on molecular and structural assembly states of disordered proteins

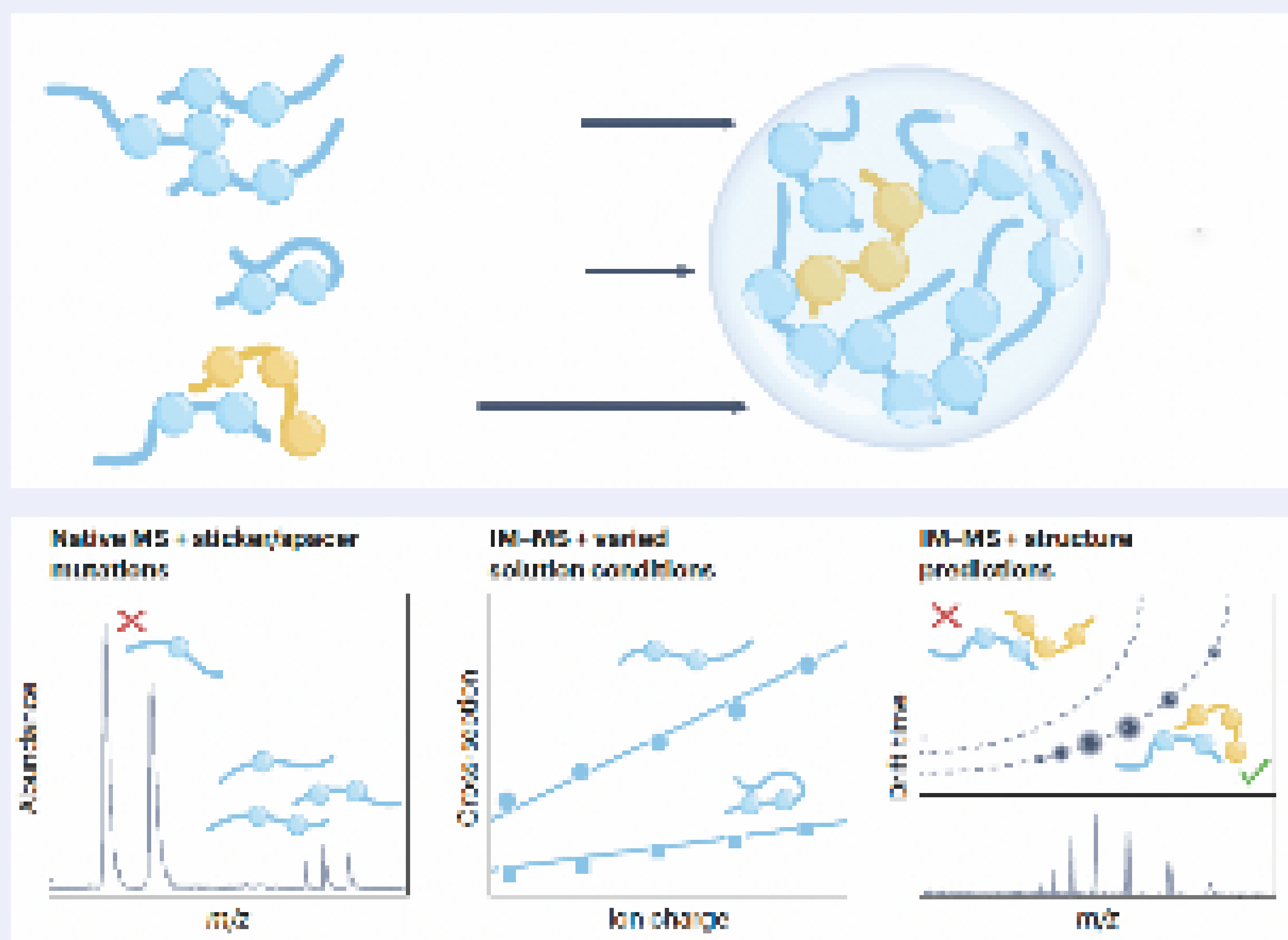


Figure 1. Liquid-Liquid Phase Separation monitored by Mass Spectrometry. One can study client binding, assembly states and structure.

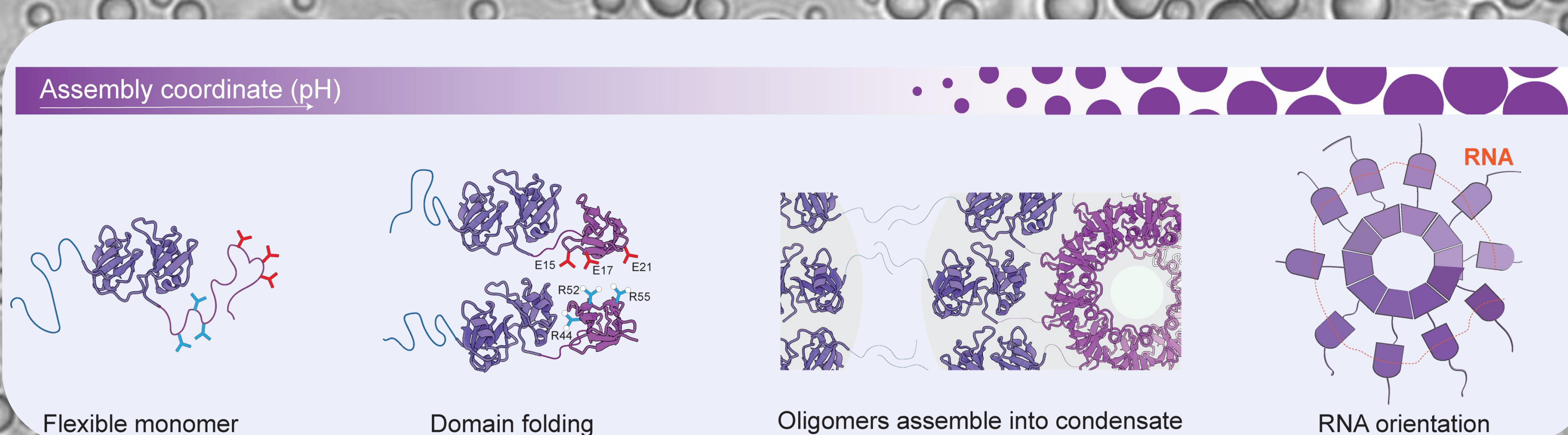


Figure 2. Assembly process of TDP-43 from monomer, to oligomer, to liquid droplets

Please contact us if you would like to conduct a project in our group!

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