

S E M I N A R
Wednesday 29/05/19, 11:00 am
Building 211, seminar room

SPEAKER:

Dr. Eyal Arbely

Department of Chemistry and the National Institute for Biotechnology
Ben-Gurion University of the Negev

TOPIC:

**Genetic code expansion technology for
biochemical studies**

The chemical repertoire of genetically encoded amino acids can now be expanded beyond the 20 canonical amino acids using genetic code expansion (GCE) technology. By utilizing an orthogonal aminoacyl-tRNA synthetase/tRNA pair and an alternative codon (e.g., the UAG stop codon) GCE enables the site-specific incorporation of NCAAs with unique chemical groups into ribosomally synthesized proteins. *One* of the emerging applications of GCE is the incorporation of NCAAs bearing functional groups at a single site in the protein for subsequent chemoselective reactions. We used an orthogonal and evolved pyrrolysine tRNA synthetase/tRNA_{CUA} pair to genetically encode the incorporation of strained alkenes and alkynes into proteins expressed in cultured mammalian cells. These proteins were then labeled with tetrazine-conjugated fluorescent organic dyes via an inverse electron demand Diels-Alder reaction. The site-specific and biorthogonal fluoregenic reaction enabled fluorescent imaging of α -tubulin and membrane anchored proteins at high resolution in live cells, and provided a superior alternative for fluorescence imaging based on fluorescent proteins. *Another* attractive application of GCE is the incorporation of post-translationally modified amino acids that allows the synthesis of homogeneously and site-specifically modified proteins in bacteria and cultured mammalian cells. In particular, we genetically encoded the incorporation of N ϵ -acetyl lysine and its derivatives, in order to study the structural and functional role of lysine acetylation in the regulation of transcription.