aggregation. Our results indicated MOFs play a role as a good nano-career porous material with low toxicity feature for drug careening.

2635-Pos
Self-assembly of Fmoc-diphenylalanine in water above the critical pH for gelation
Emily F. Hughes, Nichole O'Neill, Reinhard Schweitzer-Stenner.
Chemistry, Drexel University, Philadelphia, PA, USA.
The dipeptide, fluorenylmethyloxycarbonyl- di- phenylalanine (FmocFF), has displayed the self-assembly characteristics of short peptides in a way to induce hydrogel formation. The biocompatibility of these hydrogels makes them an important material to study. The underlying fibrils of the gel phase are built of β-sheets stabilized by ππ stacking between respective aromatic side chains and end group of the peptide. Gel formation can be triggered by adding water to dimethysulfoxide or by dissolving the peptide at a pH greater than 10.0 and subsequently titrating with HCl. Our research focuses on characterizing the state of FmocFF self-assembly above the critical pH. To this end we recorded mid UVCD, FTIR and ^{1}H NMR spectra of FmocFF at different concentrations in the milli- and centimolar range as a function of temperature. Corresponding CD spectra taken at different temperatures exhibit dichroic points indicating a two-state equilibrium. The obtained temperature dependences of the spectra suggest that the melting of peptide fibrils involve two separable phases. Preliminary experiments suggest that spectral characteristics and the melting process change significantly with increasing peptide concentration in the lower centimolar range. The obtained decrease of rotational strength at high temperatures suggests a loss of ππ-stacking. This notion is corroborated by the concomitant downfield move of chemical shifts assignable to CH groups of phenylalanine side chains. The amide I bands in the FTIR spectrum of the peptide reveal a canonical β-sheet structure. Surprisingly, we found them to be nearly temperature independent which suggests that the above melting process yields ordered oligomers rather than monomers.

2636-Pos
Direct imaging of RNA loaded lipid-nanoparticles' self assembly and cellular expression for cancer immunotherapy and RNA-based vaccines
Jewel Ashbrook[1], Michael C. Chung[2], Hector Mendez-Gomez[3], Elias Sayour[3], Juan Guan[2].
[1]Middlebury College, Middlebury, VT, USA, [2]Department of Physics, University of Florida, Gainesville, FL, USA, [3]UF Brain Tumor Immunotherapy Program, Lillian S. Wells Department of Neurosurgery, University of Florida, Gainesville, FL, USA.
The field of immunology has seen a rapid expansion in new cancer immunotherapy and RNA-based vaccines. RNA-based vaccines have recently demonstrated great promise in addressing public health crises such as COVID-19. Additionally, RNA nanoparticle (RNA-NP) technology may be used to create a viable cancer treatment option. RNA-NPs were made by adding RNAs to liposomes which act as a delivery vehicle to safely transport RNA to the body's immune cells in an attempt to elicit an immune response. However, the understanding of RNA-NP assembly processes and how they relate to downstream immunogenicity is still limited, hindering progress on improving the efficacy of cancer immunotherapy. Advanced imaging with high spatiotemporal resolution is needed to understand how RNA-NPs assemble, how cells interact with RNA-NPs, and which biophysical properties affect transfection efficiency. Here, we manipulate various RNA-NP preparation parameters, such as temperature and concentration, while observing the effect on nanoparticle aggregation using a home-built epifluorescent microscope. Live cell experiments were conducted to determine the downstream effects of these manipulations through RNA-NP uptake as well as transfection efficiency. Our results show that the temperature at which RNA-NPs are incubated greatly affects aggregate area. They also suggest that smaller nanoparticle aggregates are more effective in transfection of DC2.4 (the mouse dendritic cell line used through the experiment). Our work offers insight into the RNA-NP assembly process and opens up new opportunities to fine-tune the biophysical properties of RNA-NPs to improve cancer immunotherapy.

2637-Pos
Gene regulation using nanodiscs modified with HIF-1-α antisense oligonucleotides
Radhika Sharma.
Chemistry, Emory University, Atlanta, GA, USA.
Delivery of nucleic acids can be hindered by multiple factors including nuclease susceptibility and the lack of an appropriate delivery vehicle. With multiple nanotechnology scaffolds, lipid-based systems are the preferred choice because of its high biocompatibility and low toxicity. However, many lipid nanoparticle systems still have issues regarding stability, rapid clearance, and cargo leakage. Here, we demonstrate the use of a synthetic nanodisc (ND) scaffold functionalized with an anti-HIF-1-α antisense oligonucleotide (ASO) to reduce HIF-1-α mRNA transcript levels. We prepared ND conjugates by using a mixture of phosphoglycerolipids with phosphocholine and phosphothioethanol headgroups that self-assemble into a ∼12 x 5 nm discoidal structure upon addition of 22 amino acid ApoA1 mimetic peptide. Optimized reaction conditions yielded ∼13 copies of the anti HIF-1-α ASO DNA covalently conjugated to the thiolated phospholipids using maleimide-thiol chemistry. We show that DNA-ND conjugates are active, nuclease resistant, and rapidly internalized into cells to regulate HIF-1-α mRNA levels without the use of transfection agents. DNA-ND uptake is partially mediated through scavenger receptor B1 and the ND conjugates show enhanced knockdown of HIF-1-α compared to that of the soluble ASOs in multiple cell lines. These results demonstrate that covalently functionalized NDs offer an improved platform for ASO therapeutics.

2638-Pos
Synthesizing long and repetitive proteins with mechanical properties via a "loopable translator" system
Sea On Lee, Stephen D. Fried.
Chemistry, Johns Hopkins University, Baltimore, MD, USA.
The expression of long proteins with repetitive amino acid sequences often presents a challenge in recombinant systems. In published work, we optimized a translation system that efficiently circularizes mRNA *in vivo* via a permuted self-splicing group I intron from T4 bacteriophage and translates it into concatemeric protein products (termed ''loopable'' translation). Using our loopable translator system, we have designed a genetic construct in which the *E. coli* mRNA encoding the curli protein, CsgA, is circularized and translated into a CsgA concatemer through multiple ribosome transits. The synthesis of covalently connected poly-CsgA was confirmed by SDS-PAGE, and the mechanical properties of this novel protein were characterized using a variety of analytical methods including mechanical analysis, TGA-DSC, SEM, and TEM. The data suggest that the loopable translator system is capable of synthesizing ultra-long and repetitive fibrous protein sequences that may have novel mechanical properties. This circularizing translation system may contribute to the production of protein-based polymers with diverse applications.

2639-Pos
Comparison of the antioxidant activity of aqueous extracts from traditional Chinese medicine
Lisha Mai[1], Adil Bayzhumanov[2].
[1]Biology, Shenzhen MSU-BIT University, Shenzhen, China, [2]Biology, Lomonosov Moscow State University, Moscow, Russian Federation.
Free radicals have been associated with various human diseases by introducing oxidative stress. Medicine and Food Homology (MFH) is the extraordinary alternative to supplement natural antioxidants and their long-time consumption is safe. In 2020, the Chinese government has published a new MFH list containing 9 traditional Chinese Medicines(TCMs): *Dendrobium officinale, Ganoderma lucidum, Gastrodia elata, Cornus officinalis, Eucommiae ulmoides, Cistanche deserticola, Astragalus membranaceus, Panax quinquefolium, Codonopsis pilosula*. However, the antioxidant capacity of these plants has not been fully understood and systematically measured. In this study, a comprehensive study and analysis of the antioxidant properties of these 9 TCMs were conducted. We measured the total amount of phenols, evaluated the total antioxidant activity, as well as the ability of aqueous extracts of TCMs to inhibit the Fenton reaction in blood plasma and aqueous solutions. The results showed that aqueous extracts of *Eucommia ulmoides* demonstrated the highest antioxidant activity measured by all methods. Authors acknowledge financial support from Shenzhen Science and Technology Innovation Committee (People's Republic of China), project number 20200828172651001.

2640-Pos
Interfacial properties of barnacle derived peptides and their tandemization into proteins
Elizabeth A. Yates[1,2], Michael C. Wilson[3], Maryssa Beasley[3], Christopher R. So[4].
[1]Chemistry, United States Naval Academy, Annapolis, MD, USA, [2]Sited in Chemistry Division, Code 6176, U.S. Naval Research Laboratory, Washington, DC, USA, [3]NRC Postdoctoral Associate, Sited in Chemistry Division, Code 6176, U.S. Naval Research Laboratory, Washington, DC, USA, [4]Chemistry Division, Code 6176, U.S. Naval Research Laboratory, Washington, DC, USA.
Barnacles, a tenacious, cosmopolitan biofouling organism, produce a micron-thick layer of proteinaceous amyloid-like underwater adhesive. Derived from consensus barnacle cement sequences from *Amphibalanus amphitrite*, we have identified a charge pattern domain which plays a key role in nanomaterial