- Magnetic carbon nanostructures in medicine
  **Abstract:**

Magnetic carbon nanostructures are hybrid materials containing magnetic and carbon (mainly sp\(^2\)) nanoallotrope components conjugated in various configurations. Their potential applications in medicine including drug delivery systems, magnetic particle/fluid hyperthermia anti-cancer therapy and magnetic resonance imaging are reviewed.

- Fabrication of Thermoresponsive Cross-Linked Poly(N-isopropylacrylamide) Nanocapsules and Silver Nanoparticle-Embedded Hybrid Capsules with Controlled Shell Thickness
  **Abstract:**

We report on the fabrication of thermoresponsive cross-linked hollow poly(N-isopropylacrylamide) (PNIPAM) nanocapsules and silver nanoparticle-embedded hybrid PNIPAM nanocapsules with controlled shell thickness via the combination of surface-initiated atom transfer radical polymerization (ATRP) and “click” cross-linking. Starting from initiator-functionalized silica nanoparticles, the surface-initiated ATRP of N-isopropylacrylamide (NIPAM) and 3-azidopropylacrylamide (AzPAM) afforded hybrid silica nanoparticles surface coated with P(NIPAM-co-AzPAM) brushes. Hybrid PNIPAM nanocapsules were then fabricated by the “click” cross-linking of PNIPAM shell layer with a trifunctional molecule, 1,1,1-tris(4-(2-propynoxy)phenyl)ethane, followed by the subsequent removal of silica cores via HF etching. Shell cross-linked hybrid silica nanoparticles can further serve as templates for the in situ preparation of silver nanoparticles within the cross-linked PNIPAM layer. After HF etching, silver nanoparticle-embedded hybrid PNIPAM nanocapsules were obtained. Due to the thermoresponsiveness of PNIPAM, cross-linked PNIPAM nanocapsules and silver nanoparticle-embedded hybrid PNIPAM nanocapsules exhibit thermo-induced collapse/swelling transitions. In the latter case, the spatial distribution of Ag nanoparticles within the hybrid PNIPAM nanocapsules can be facilely modulated by temperature variations, as revealed by the thermo-induced red shift of surface plasmon absorption band. Dynamic laser light scattering (LLS) measurements revealed that PNIPAM nanocapsules and Ag nanoparticle-embedded hybrid...
PNIPAM nanocapsules exhibit more prominent thermo-induced dimensional changes, as compared to shell cross-linked hybrid silica/PNIPAM nanoparticles loaded with or without Ag nanoparticles, respectively. Due to that the surface-initiated ATRP can be conducted in a controlled manner, the current strategy employed for the fabrication of structurally stable cross-linked PNIPAM nanocapsules and Ag nanoparticle-embedded hybrid PNIPAM nanocapsules can be further applied to the preparation of other functional hollow hybrid nanostructures with controlled dimensions.

- Nanoparticle-mediated signaling endosome localization regulates growth cone motility and neurite growth


Abstract:

Understanding neurite growth regulation remains a seminal problem in neurobiology. During development and regeneration, neurite growth is modulated by neurotrophin-activated signaling endosomes that transmit regulatory signals between soma and growth cones. After injury, delivering neurotrophic therapeutics to injured neurons is limited by our understanding of how signaling endosome localization in the growth cone affects neurite growth. Nanobiotechnology is providing new tools to answer previously inaccessible questions. Here, we show superparamagnetic nanoparticles (MNPs) functionalized with TrkB agonist antibodies are endocytosed into signaling endosomes by primary neurons that activate TrkB-dependent signaling, gene expression and promote neurite growth. These MNP signaling endosomes are trafficked into nascent and existing neurites and transported between somas and growth cones in vitro and in vivo. Manipulating MNP-signaling endosomes by a focal magnetic field alters growth cone motility and halts neurite growth in both peripheral and central nervous system neurons, demonstrating signaling endosome localization in the growth cone regulates motility and neurite growth. These data suggest functionalized MNPs may be used as a platform to study subcellular organelle localization and to deliver nanotherapeutics to treat injury or disease in the central nervous system.

- Enhancing Hydrogen Evolution Activity in Water Splitting by Tailoring Li⁺-Ni(OH)₂-Pt Interfaces


Abstract:
Improving the sluggish kinetics for the electrochemical reduction of water to molecular hydrogen in alkaline environments is one key to reducing the high overpotentials and associated energy losses in water-alkali and chlor-alkali electrolyzers. We found that a controlled arrangement of nanometer-scale Ni(OH)\textsubscript{2} clusters on platinum electrode surfaces manifests a factor of 8 activity increase in catalyzing the hydrogen evolution reaction relative to state-of-the-art metal and metal-oxide catalysts. In a bifunctional effect, the edges of the Ni(OH)\textsubscript{2} clusters promoted the dissociation of water and the production of hydrogen intermediates that then adsorbed on the nearby Pt surfaces and recombined into molecular hydrogen. The generation of these hydrogen intermediates could be further enhanced via Li\textsuperscript{+}-induced destabilization of the HO–H bond, resulting in a factor of 10 total increase in activity.

- Visible to Near-IR Electrochromism and Photothermal Effect of Poly(3,4-propylenedioxysele

A new selenophene derivative, 3,4-propylenedioxysele

Upon exposure to a NIR source (0.7 W cm\textsuperscript{−2}), the doped PProDOS film resulted in a temperature rise of 10.7 °C compared to that of the bare indium tin oxide (ITO) coated glass, while the navy blue colored PProDOS film experienced a temperature rise of 10.2 °C. This photothermal effect by NIR light exposure was switchable between the colored and bleached state by simply dedoping and
doping the film electrochemically, respectively. Furthermore, bleached PProDOS particles dispersed in water (0.05 mg mL−1) also showed a high photothermal effect (2 W cm−2) with a temperature rise of 13.1 °C, as compared to pure water. Compared with poly(3,4-ethylenedioxythiophene) (PEDOT), it was found that the new selenophene polymer (PProDOS) provided efficient visible to NIR electrochromism in addition to the high photothermal effect, resulting in a large temperature rise and heat conversion upon exposure to a NIR source.

- Dynamic Viscoelasticity of Poly(butyl acrylate) Elastomers Containing Dangling Chains with Controlled Lengths
  Abstract:
  
  We demonstrate that the poly(butyl acrylate) (PBA) elastomers containing considerable amounts of dangling chains with uniform lengths exhibit pronounced viscoelastic relaxation (tan δ > 1) at characteristic frequencies. The elastomers are obtained by the copolymerization of monoacryloyl- and diacryloyl-terminated precursor PBA with narrow size distributions. The molecular weights of the precursors are smaller than the critical molecular weight for the onset of entanglement coupling. The relaxation time of the elastomers (τD) is proportional to the square of the molecular weight of the dangling chains equivalent to the monofunctional PBA (MD), and τD is about 2.5 times larger than the relaxation time of the corresponding free guest chains in the elastomers (τG). These observations are close to the expectations from the Rouse-chain dynamics without entanglement effect (τD MD2 and τD = 4τG). These results provide an important basis for the understanding of the dynamics of the unentangled chains whose one end is tethered to the permanent networks. The results also offer a route of molecular control of characteristic frequency and strength of mechanical damping of elastomers.

- Is DNA’s Rigidity Dominated by Electrostatic or Nonelectrostatic Interactions?
  Abstract:
Double-stranded DNA is among the stiffest biopolymers, whose bending propensity crucially influences many vital biological processes. It is not fully understood which among the two most likely forces, electrostatic self-repulsion or the compressive base pair stacking, plays a dominant role in determining the DNA’s unique rigidity. Different theoretical and experimental studies led so far to contradictory results on this issue. In this Communication, we address this important question by means of Molecular Dynamics (MD) simulations using both atomistic and coarse-grained force fields. Using two independent sets of calculations, we found that electrostatic and nonelectrostatic effects play a comparable role in maintaining DNA’s stiffness. Our findings substantially differ from predictions of existing theories for DNA rigidity and may indicate that a new conceptual understanding needs to be developed.

- Radical Cation Diels–Alder Cycloadditions by Visible Light Photocatalysis

  Abstract:

  Ruthenium(II) polyppyridyl complexes promote the efficient radical cation Diels–Alder cycloaddition of electron-rich dienophiles upon irradiation with visible light. These reactions enable facile [4 + 2] cycloadditions that would be electronically mismatched under thermal conditions. Key to the success of this methodology is the availability of ligand-modified ruthenium complexes that enable rational tuning of the electrochemical properties of the catalyst without significantly perturbing the overall photophysical properties of the system.

- Self-Assembly of Dimeric Tetrathiafulvalene-Calix[4]pyrrole: Receptor for 1,3,5-Trinitrobenzene

  Abstract:

  The synthesis and binding properties of a tetrathiafulvalene (TTF)-calix[4]pyrrole receptor 2 appended with one 3,5-dinitrobenzoate guest moiety are reported. The preliminary studies revealed that the receptor is self-complexing into a dimer receptor 2•2. The self-complexation of the receptor leads to preorganization—in its 1,3-alternate conformation—and as a result hereof, the dimer receptor 2•2 is displaying a 2 order higher binding affinity toward analytes (e.g., 1,3,5-trinitrobenzene) than the model tetrathiafulvalene (TTF)-calix[4]pyrrole receptor 3.
• Palladium-Catalyzed Direct Olefination of Urea Derivatives with n-Butyl Acrylate by C–H Bond Activation under Mild Reaction Conditions
   Abstract:
   \[
   \text{Pd}^{II} \text{-catalyzed aromatic C–H bond activation using urea as a directing group was achieved in a p-TsOH/AcOH medium under mild reaction conditions. The direct olefination products of various urea derivatives were produced from aryl urea derivatives and butyl acrylate in moderate to good yields.}
   \]

• Synthesis of Biaryls via AlCl₃ Catalyzed Domino Reaction Involving Cyclization, Dehydration, and Oxidation
   Abstract:
   A new chemical access has been developed to synthesize biaryls from substituted acetophenones, phenylaceton, dihydrochalcone, and 2-acetylnaphthalene in reasonably good yields at room temperature via a domino reaction sequence of AlCl₃ catalyzed cyclization, dehydration, and then oxidation.

• Manganese Dioxide Catalyzed N-Alkylation of Sulfonamides and Amines with Alcohols under Air
   Abstract:
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   \text{By simply running the reactions under air and solvent-free conditions using catalytic amounts of manganese dioxide, a practical and efficient N-alkylation method for a variety of sulfonamides and amines using alcohols as green alkylation reagents was developed.}
   \]

• Encapsulation, release and applications of LbL polyelectrolyte multilayer capsules
   Abstract:
Ever since their invention in 1998, polyelectrolyte multilayer micro- and nano-capsules have impacted various areas of biology, chemistry and physics. Here we highlight progress achieved since the millennium in the areas of encapsulation in and release from microcapsules, describe various structures including multicompartement and anisotropic constructs, and provide examples of several applications in biology. We also describe application areas such as drug delivery, intracellular trafficking, enzyme-catalyzed reactions, mechano-biology which benefited from recent developments in the area of polyelectrolyte multilayer capsules.

- Pseudorotaxane structure of a fullerene derivative—cyclodextrin 1 : 2 complex
  **Abstract:**

X-Ray crystallography revealed that the C60 derivative-γ-cyclodextrin (γ-CDx) complex has a pseudorotaxane structure and the structure of the crystal clarified the importance of multi-point hydrogen bonds between two γ-CDxs for stabilising the 3-γ-CDx complex.

- PS-b-P3HT Copolymers as P3HT/PCBM Interfacial Compatibilizers for High Efficiency Photovoltaics
  **Abstract:**
A conducting diblock copolymer of PS-b-P3HT was added to serve as a compatibilizer in a P3HT/PCBM blend, which improved the power-conversion efficiency from 3.3% to 4.1% due to the enhanced crystallinity, morphology, interface interaction, and depth profile of PCBM.

- Efficient Flexible Phosphorescent Polymer Light-Emitting Diodes Based on Silver Nanowire-Polymer Composite Electrode
  Abstract:

  Blue, green, and red electrophosphorescent polymer light-emitting diodes have been fabricated on silver nanowire-polymer composite electrode. The devices are 20%-50% more efficient than control devices on ITO/glass and exhibit small efficiency roll-off at high luminances. The blue PLEDs were repeatedly bent to 1.5 mm radius concave or convex with calculated strain in the emissive layer approximately 5% (tensile or compressive).

- Conductive dense hydrogen
  Abstract:

  Molecular hydrogen is expected to exhibit metallic properties under megabar pressures. This metal is predicted to be superconducting with a very high critical temperature, $T_c$, of 200–400 K, and it may acquire a new quantum state as a metallic superfluid and a superconducting superfluid. It may potentially be recovered metastably at ambient pressures. However, experiments carried out at low temperatures, $T<100$ K, showed that at record pressures of 300 GPa, hydrogen remains in the molecular insulating state. Here we report on the transformation of normal molecular hydrogen at room temperature (295 K) to a conductive and metallic state. At 200 GPa the Raman frequency of the molecular vibron strongly decreased and the spectral width increased, evidencing a strong interaction between molecules. Deuterium behaved similarly. Above 220 GPa, hydrogen became opaque and electrically conductive. At 260–270 GPa, hydrogen transformed into a metal as the conductance of hydrogen sharply increased and changed little on further pressurizing up to 300 GPa or cooling to at least 30 K; and the sample reflected light well. The metallic phase transformed back at 295 K into molecular hydrogen at $\sim$200 GPa. This significant hysteresis indicates that the transformation of molecular hydrogen into a metal is accompanied by a first-order structural
transition presumably into a monatomic liquid state. Our findings open an avenue for detailed and comprehensive studies of metallic hydrogen.

- Cytocompatible click-based hydrogels with dynamically tunable properties through orthogonal photoconjugation and photocleavage reactions
  Abstract:

To provide insight into how cells receive information from their external surroundings, synthetic hydrogels have emerged as systems for assaying cell function in well-defined microenvironments where single cues can be introduced and subsequent effects individually elucidated. However, as answers to more complex biological questions continue to be sought, advanced material systems are needed that allow dynamic alteration of the three-dimensional cellular environment with orthogonal reactions that enable multiple levels of control of biochemical and biomechanical signals. Here, we seek to synthesize one such three-dimensional culture system using cytocompatible and wavelength-specific photochemical reactions to create hydrogels that allow orthogonal and dynamic control of material properties through independent spatiotemporally regulated photocleavage of crosslinks and photoconjugation of pendant functionalities. The results demonstrate the versatile nature of the chemistry to create programmable niches to study and direct cell function by modifying the local hydrogel environment.

- Squaraine Dyes as Efficient Coupling Bridges between Triarylamine Redox Centres
  Abstract:

Various indolenine squarylium dyes with additional electron-donating amine redox centres have been synthesised and their redox chemistry has been studied. A combination of cyclic voltammetry, spectro-electrochemistry and DFT calculations has been used to characterise the electronic structure of the mono-, di- and, in one case, trications. All monocations still retain the cyanine-like, delocalised character due to the relatively low redox potential of the squaraine bridge and are therefore compounds of Robin–Day class III. Thus we extended previous studies on organic mixed-valence systems by using the indolenine squaraine moiety as very electron-rich bridge between two electron-donating amine redox centres to provoke a strong coupling between the additional redox centres. We synthesised TA3, which has an N–N distance of 26 bonds between the triarylamine redox centres
and is to our knowledge the longest bis(triarylamine) radical cation that is completely delocalised. We furthermore show that altering the symmetry of a squaraine dye by substitution of a squaric ring oxygen atom by a dicyanomethylene group has a direct impact on the optical properties of the monocations. In case of the dications, it turned out that the energetically most stable state of dianisylamine-substituted squaraines is an anti-ferromagnetically coupled open-shell singlet state.

- Conformationally Constrained Sequence Designs to Bias Monomer–Dimer Equilibriums in TASP Systems
  Abstract:

We have designed template-assembled synthetic proteins (TASPs) with the intent of controlling their oligomeric state by stabilizing specific helical tertiary structures via histidine metal ion chelation or disulfide incorporation. In solution, cavitein Q4 was previously determined to interconvert between a four-helix bundle monomer and an eight-helix bundle dimer. In this paper, we show that judicious mutation of cavitein Q4 can stabilize either the monomeric parallel four-helix bundle or the dimeric antiparallel eight-helix bundle structure. Cavitein Q4-E3H, designed to be dimeric, is indeed biased toward dimerization as a result of incorporation of histidines. Moreover, the addition of nickel was found to further increase the association constant of dimerization. Similarly, a cavitein designed to stabilize the monomeric structure via histidine metal ion chelation (Q4-H) was found to favor a monomer in solution upon addition of nickel. Lastly, a cavitein intended to stabilize a monomeric structure via disulfide incorporation (Q4-C2) is reported. Surprisingly, this disulfide cavitein yielded two products upon oxidation suggesting disulfide formation both above the cavitand template and below may be possible. Nevertheless, the two disulfide caviteins were shown to exist as monomers as per their design.

- Varietal Thiols in Wine: Discovery, Analysis and Applications
  Abstract:
Aroma compounds are produced in grapes (varietal aroma) and/or throughout the wine-making process (from oak barrels, for example). For a better understanding, they are classified according to their formation period.

Varietal aroma compounds: Grapes are nonaromatic fruits, except for a few varieties such as Muscat, which is rich in monoterpenols. However, grapes allow the production of quality wines, in which the aromatic sensations are important. That specificity is due to the presence of odorless compounds in grapes, called varietal precursors that could generate, during wine making, odoriferous compounds typical of the used grape variety.

Most of the yeast substrates during fermentation, such as sugars, lipids, and nitrogen- or sulfur-containing compounds, are also aroma precursors but are not considered as specific precursors because they lead to the formation of aroma compounds through complex biochemical reactions and the original structure of the precursors is not yet recognizable in the formed aroma compounds. On the contrary, varietal aroma compounds are already present in grapes either as a free form, which means volatile and directly perceptible by the olfactory receptors, or as a bound form, meaning linked by a covalent bond to a nonvolatile moiety (amino acid, sugar, etc.). The cleavage of that chemical bond could occur during the technical operation of wine making and lead to a so-called varietal aroma compound in which the original skeleton of the volatile moiety, biosynthesized in the plant, is preserved, even if the cleavage mechanism is due to the yeast in some cases, as for the varietal thiols.

- Carbaboranes as Pharmacophores: Properties, Synthesis, and Application Strategies

**Abstract:**

Medicinal chemistry is still clearly dominated by organic chemistry. Most of the marketed drugs are purely organic molecules. The right-hand neighbors of carbon in the periodic table, such as nitrogen, oxygen, and halogens, have already made it into a variety of pharmaceuticals. The left-hand neighbor, boron, however, is nearly unknown as an element in commercial drugs. Boron, similar to carbon, readily forms compounds with covalent boron–hydrogen bonds and also boron–boron interactions. In contrast to hydrocarbons, boranes avoid the formation of chain structures and clearly prefer the formation of polyhedral clusters (to overcome the electron deficiency) with fascinating globular architectures. Most boranes are unstable species in aqueous environments and therefore are not applicable in medicinal chemistry. In contrast, carbaboranes, in which two BH– units of closo-B12H122– are replaced by two CH vertices, have remarkable biological stability and two carbon atoms as starting points for various organic modifications. Carbaboranes for medicinal applications are preferably used to design boron neutron capture therapy (BNCT) agents. BNCT is a cancer-treating method based on the cytotoxic 10B(n,α)7Li reaction. The breakthrough in BNCT has not been achieved yet, and only a very few noncarbaborane compounds, such as l-4-(dihydroxyboryl)phenylalanine (BPA) and the sodium mercapto-undecahydro-closo-dodecaborate
are used in clinical treatments. The rationale behind the BNCT approach is the use of carbaboranes as multiple boron carriers. Connection of the cluster to a tumor-targeting vector is a common principle in the design of BNCT agents and is aimed to improve the tumor-to-blood ratio (5:1), a prerequisite for therapeutic application. Parallel to utilization as boron carriers, carbaboranes were found to be very good scaffolds for diagnostic and therapeutic labeling. BNCT and imaging research have widely explored carbaborane chemistry and provided detailed information on cluster properties and possible reactions.

- Evolution of molecular machines: from solution to soft matter interface
  Abstract:
  In the molecular machine concept, single molecules and/or small molecular assemblies operate as independent machines in the ultimate miniaturization of functional systems. For the development of molecular machines, changing the medium of operation from solution to solid surface satisfies several demands for machine functions including allowing direct observation, enabling connection with devices and facilitation of sequential actions. However, the field of molecular machines on solid surfaces is still immature when compared with the sophisticated molecular mechanical systems observed in Nature. Required further developments of molecular machines include improved dynamic operations so that investigations of molecular machine functionality at dynamic interfacial media have become important. In this paper, the development of research on molecular machines in solution and at solid interfaces is described together with an introduction of recent challenges in the operation of molecular machines at soft matter interfaces.

- Edible supramolecular chiral nanostructures by self-assembly of an amphiphilic phytosterol conjugate
  Abstract:
  We study the self-assembly of a food-grade glucose-β-sitosterol conjugate in bulk and in solution by small angle X-ray scattering (SAXS) and atomic force microscopy (AFM). The amphiphilic behavior of the glucose-β-sitosterol conjugate, combined with the chirality of both its moieties, leads in solutions to the aggregation into supramolecular chiral aggregates with plate-like, spherical and helical ribbon configurations, depending on concentration and solvent quality. Owing to the crucial role of
phytosterols in replacing cholesterol content and the need for functional edible fibrils with enhanced nutritional value, this system shows great promise in the struggle for the design of new functional food building blocks with targeted properties.

- Dendrimer-Mediated Multivalent Binding for the Enhanced Capture of Tumor Cells
  **Abstract:**

A naturally occurring multivalent binding effect is manipulated by engineering cell capture surfaces using dendrimers. The enhanced binding through the multivalent effect significantly improves detection of tumor cells. This improvement can be potentially translated into clinically significant detection of circulating tumor cells from the blood of cancer patients.

- Chiral Amplification and Helical-Sense Tuning by Mono- and Divalent Metals on Dynamic Helical Polymers
  **Abstract:**

Ion sensor: A highly dynamic poly(phenylacetylene) bearing α-methoxyphenylacetic acid (MPA) as chiral pendant exhibits selective helix induction and chiral amplification, and gives a material that acts as a sensor for the valence of metal cations. Selective coordination of the pendants with mono- or divalent metal cations determines the right- or left-handed helical sense of the polymer (see picture) and its chiroptical response.

- Calcium Ions to Cross-Link Supramolecular Nanofibers to Tune the Elasticity of Hydrogels over Orders of Magnitude
  **Abstract:**
Learning from the stabilization of protein structures, we combine aromatic–aromatic and electrostatic interactions to tailor the elasticity of supramolecular hydrogels. Specifically, calcium ions allow interfiber cross-links among the supramolecular nanofibers of small peptides that consist of multiple carboxylic acid and aromatic groups. A small change in the concentration of calcium increases the elasticity of hydrogels over several orders of magnitude. This simple approach not only demonstrates a biomimetic design of materials but also confirms that the combination of multiple aromatic–aromatic interactions and multiple calcium salt bridges is a feasible way to control the mechanical properties of soft nanomaterials.

- Effect of Glycine Substitution on Fmoc–Diphenylalanine Self-Assembly and Gelation Properties

Abstract:

We have investigated the self-assembly behavior of fluorenly-9-methoxycarbonyl (Fmoc)–FG, Fmoc–GG, and Fmoc–GF and compared it to that of Fmoc–FF using potentiometry, fluorescence and infrared spectroscopy, transmission electron microscopy, wide-angle X-ray scattering, and oscillatory rheometry. Titration experiments revealed a substantially shifted apparent pKa transition for Fmoc–FG, Fmoc–GG, and Fmoc–GF. The apparent pKa values observed correlated with the hydrophobicity (log P) of the Fmoc–dipeptide molecules. Fmoc–GG and Fmoc–GF were found to self-assemble only in their protonated form (below their apparent pKa), while Fmoc–FG formed self-assembled structures above and below its apparent pKa. Fmoc–GG and Fmoc–FG were found to form hydrogels below their apparent pKa transitions in agreement with the entangled fibers morphologies revealed by TEM. Unlike Fmoc–FF and Fmoc–GG, Fmoc–FG showed unusual gelation behavior as gels were found to form upon heating. Fmoc–GF formed precipitates instead of a hydrogel below its apparent pKa in agreement with the formation of micrometer scale sheetlike structures observed by TEM. The fact that all four Fmoc–dipeptides were found to self-assemble suggests that the main driving force behind the self-assembly process is a combination of the hydrophobic and π–π interactions of the fluorenly moieties with a secondary role for hydrogen bonding of the peptidic components. The nature of the peptidic tail was found to have a pronounced effect on the type of self-assembled structure formed. This work indicates that the substitution of phenylalanine by glycine significantly impacts on the mode of assembly and illustrates the versatility of aromatic peptide amphiphiles in the formation of structurally diverse nanostructures.