The 80,000 square foot Physical Sciences Building (PSB) is now open! It provides space for 80 chemistry graduate students and postdocs in 22,000 square feet of state-of-the-art synthetic chemistry labs on Levels 1 and 2, and specialized, “high bay” space for physics on the lower floor. The PSB will be home to 6-8 chemistry research groups, including the Andrew, Kittilstved, Thayumanavan, and Venkataraman groups, who have just moved in (August 2018), as well as new faculty hires.

The building was designed by Wilson Architects and construction was managed by Whiting-Turner. Enhancing collaboration between groups and within a group was a major design goal, as was creating efficient use of space with the flexibility to be readily adapted to meet evolving research needs. The labs feature an open floor plan, so lab space for one group is adjacent to that of another, with no walls between them. In addition to the clear advantages of increasing interactions between groups, this provides the ability for the amount of lab space each group uses to broadly follow changes in group size.

The PSB incorporates numerous green building features and has earned Silver LEED (Leadership in Energy and Environmental Design) certification, which is very challenging for a building with such high air-handling requirements. The extensive windows and glass wall allow natural light to illuminate the labs. Energy- and water-saving features include high-efficiency fume hoods with a hood monitoring system to encourage closing of hood sashes when not in use and a closed-cycle chilled water loop (for stills, etc.). There is open space for specialized instrumentation like glove boxes, and dedicated rooms for high hazard work, solvent dispensing, and mammalian and bacterial cell culture.

The Venkataraman and Kittilstved groups are on the first floor. The Venkataraman group synthesizes novel organic and hybrid organic/inorganic materials for energy harvesting and storage. They are designing new types of metal halide perovskites, with the goal of improving the stability of these promising solar energy collection materials. They also study how the charge is transported in perovskites, which is key to their use as electronic materials. In energy storage, they have recently made a significant advance, achieving the highest energy density to date in a photothermal battery. The device is based on an azobenzene-based poly(methacrylate) polymer which they designed and synthesized. Prof. Venkataraman notes, “The PSB is a boost for collaborative research. It will help foster a dynamic research community in synthetic and materials chemistry. My research group will share the lab corridor with Prof. Kevin Kittilstved’s group, which will allow our groups to interact on a daily basis and exchange ideas. These interactions will lead to exciting and transformative science.”

The Kittilstved group develops methods to synthesize novel inorganic materials for renewable-energy applications and spin-based technologies. The materials are primarily inorganic semiconductors and related molecular clusters with controlled doping that confers novel magnetic, electronic and optical properties. Please see p. 9 for more on their research. “The main thing that I’m excited about with the move to the PSB is that it will enable...
new interactions between students and faculty as well as strengthen existing collaborations among chemists, and also with physicists. This is a win-win for materials chemistry and I am looking forward to welcoming new faculty in 2019,” says Prof. Kittilstved.

The Thayumanavan and Andrew groups share the second floor. The Andrew group designs and synthesizes organic molecules that they polymerize (or in some cases, crystallize) to produce materials with useful electrical, optical and magnetic properties. Applications include wearable electronics, high-resolution optical lithography, and magnetic tunnel junction devices. Their research is described in more detail on page 8.

The Thayumanavan group is the largest group moving into the PSB, with 22 graduate students, a postdoctoral fellow and a Research Assistant Professor. The Thayumanavan group designs and synthesizes small molecules and polymers that self-assemble into nanoscopic systems with the capability of autonomously responding to specific microenvironments. Such capabilities have impact in a variety of applications, ranging from engineered self-healing materials to nanomedicine. In the area of nanomedicine for example, the group is interested in delivering therapeutic small molecules or biologics to specific tissue targets with implications in many diseases, especially liver diseases and oncology. Prof. Thayumanavan and members of his group are thrilled with the new space, “The exciting aspects about the PSB move are multi-fold. The building has an open-lab space plan that fosters collaboration among the students within the group; it is more centrally located between our collaborators’ labs, which is ideal for enhancing efficiencies in our collaborative research; and the more modernized facilities offer an overall better and safer setting for cutting-edge research. For our own research group, it brings all our team-members into a single lab space, which we are particularly excited about.”

With its many state-of-the art, adaptable and user-friendly features, the PSB will inspire students, postdocs and faculty, and will foster interdisciplinary and collaborative research for decades to come.