Not only Marilyn Monroe knew that “diamonds are a girl’s best friend” but that they are also a very interesting field for chemists. The chemist’s diamonds are usually quite small (nanometer-sized “diamondoids” or “nanodiamonds”) and are normally measured by their utility as unusual chemical building blocks. Since lower diamondoids (up to triamantane) are available in large amounts from petroleum and higher diamondoids (starting from tetramantane) are now also accessible from crude oil new research emerges. The advantage of possessing knowable and well-defined structures makes these cage compounds so special. Selective and high-yielding synthetic approaches to the functionalization of diamondoids show that applications including their usage as spacers in polymers, coating materials, medical drugs, and organocatalysts are close to realization and steps toward these goals will be presented in detail in the lecture.