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Controlling, modulating, and monitoring the electronic and mechanical properties of molecular junction devices at single-molecule level

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Molecular electronics, where single molecules are used as devices- molecular wires, rectifiers and transistors - is a topic of considerable interest at present. Although substantial efforts are being made to bring the ideas of molecular devices into reality, this field is still somewhat futuristic and need further experimental and theoretical investigation. Future experimental techniques that can fabricate molecular junction devices with molecule electrode contacts that are well defined on the atomic scale and that can characterize the atomic-scale structures of the molecule-electrode contacts with more efficient and more precise control of electron transport will contribute enormously to the field of molecular electronics. We will describe highly integrated and effective methods to simultaneously fabricate, control and modulate, and monitor the electronic and mechanical properties of molecular junction devices at the single-molecule level. The simultaneity will minimize variations normally occur in individualized approaches and thus offer more detailed information and greater understanding of molecular junctions and of processes. Various molecule systems will be discussed.