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InAs Lateral Quantum Dot Molecules With Controllable Configurations MICHAEL YAKES, Naval Research Laboratory, ALLAN BRACKER, CORY CRESS, JOE TISCHLER, DANNY KIM, ALEX GREILICH, DAN GAMMON — Well controlled, vertically-stacked quantum dot molecules (QDMs) are now routinely grown for optical investigations. For device applications, laterally coupled dots offer compatibility with existing gate technologies and advantages in scalability. One promising technique for creating laterally coupled QDMs is to use gallium droplet epitaxy to form homoepitaxial mounds which serve as a template for further dot growth. In this presentation, we will describe new growth techniques that can be used to control the configuration of lateral QDMs. In addition, by capping first layer QDMs and growing additional strain-coupled dots, we demonstrate flexible and uniform three dimensional QDM configurations. We use AFM and cross sectional STM to study the morphology of as-grown and capped QDMs. These results demonstrate that these QDMs are excellent candidates for investigations of electron tunneling using photoluminescence (PL) spectroscopy. We will present ensemble PL spectra and discuss techniques for extending this method to create QDMs that can be measured using single molecule PL spectroscopy.

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