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Extraction of quantum dot size from real time RHEED intensity profiles.[1] C. RAJAPAKSHA, A. FREUNDLICH, Center for Advanced Materials and Physics department, University of Houston — Semiconductor quantum dots (QDs) have attracted much attention over the past decade due to their potential applications in nano-scale devices. Thus for the performance of many of those devices determination of structural properties of QDs during growth is highly desirable. Reflection high energy electron diffraction (RHEED) is a powerful technique that can be applied to provide in situ real-time structure evolution during thin film growth in high vacuum epitaxial deposition techniques like molecular beam epitaxy. Although it has been shown that the average facet orientation and QD coverage density could be extracted real time from the evolution of RHEED patterns, to date no study was able to provide a method to extract size of QDs during growth. Recently our group, using an analysis based on the kinematical diffraction theory, has predicted that QD heights can be directly extracted from predicted intensity fringes along the chevron tails. In this study RHEED patterns of uncapped faceted self assembled InAs Stranski-Krastanov quantum dots fabricated on GaAs (001) substrate are investigated both theoretically and experimentally. We report the experimental evidence on the existence of these periodic RHEED intensity fringes along chevron tails and demonstrate the possibility of real time assessment of dot size during the growth of self assembled QDs.

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