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Substrate Transferred Crystalline AlGaAs Coatings Status

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Substrate-transferred crystalline coatings have demonstrated low thermal noise and excellent optical properties in multiple precision optics applications. The primary challenge in implementing these single-crystal gallium arsenide / aluminum gallium arsenide multilayers in terrestrial interferometric gravitational-wave detectors is the necessity to scale the size of the coatings to ≥ 30 cm in diameter on fused silica substrates with ≥ 40 kg mass. This scaling effort is primarily an engineering development project that will require significant financial investment to design and construct dedicated equipment for producing these novel optics. We will present the latest results from laboratory measurements of GaAs-based crystalline coatings, as well as plans for future measurements. We will also discuss possible paths forward for realizing and implementing LIGO-relevant ultralow-los semiconductor supermirrors.

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