

**Pulsed laser deposition of thin films for optical and lasing waveguides (including tricks, tips and techniques to maximize the chances of growing what you actually want).**

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In the last 20-25 years, the technique of pulsed laser deposition (PLD) has emerged as a versatile, relatively fast and conceptually simple technique for growing a range of thin films of essentially *any* material. And while it is true that you will almost always grow *something* for your efforts, trying to optimise PLD so that what you grow is what you intended to grow is a different matter entirely. In this talk, I will use the growth of thin film doped crystalline materials that we are using as lasing waveguide structures as an example of how to tame the PLD process to produce high quality films that can match bulk crystal samples in terms of their final lasing performance. I will cover the technical aspects of substrate heating, particulate removal strategies, layer uniformity and crystal quality, and then move onto more advanced concepts such as single target versus multitarget geometries, mixed, layered, superlattice and Bragg structures and finally growth of 'polo' crystals, that have selected dopants only in the centre of the film, for application as thin disc lasers.



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