A computational study of growth and mechanical loss of amorphous Ta_2O_5

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The first detection of gravitational wave with the laser interferometer gravitational-wave observatory (LIGO) opens a new age of gravitational wave astronomy.[1] The optical system of the detector need the accuracy of the path length of light better than 10^{-18} m, which require the system to have an extremely low noise. The thermal noise intensity is directly related to the quality of the mirror coating in optical system. Understand the origin of the thermal noise and how to lower the noise level and fabricate a better mirror coating material become one of the key to further increase the accuracy of the detector.

In this work, we generated a series of amorphous Ta_2O_5 theoretical models from different method (simulated growth, melting quench and reverse Monte Carlo method), which can comparable to the experiment and study the mechanical loss.

References

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