The delivery of mechanical power, a crucial component of animal motion, is constrained by the universal compromise between the force and the velocity of its constituent molecular systems. While the mechanisms of force generation have been studied at the single molecular motor level, there is little understanding of the magnitude of power that can be generated by folding proteins. Here, we use single-molecule force spectroscopy techniques to measure the force-velocity relation of folding titin domains that contain single internal disulfide bonds, a common feature throughout the titin I-band. We find that formation of the disulfide regulates the peak power output of protein folding in an all-or-none manner, providing at 6.0 pN, for example, a boost from 0 to 6,000 zW upon oxidation. This mechanism of power generation from protein folding is of great importance for muscle, where titin domains may unfold and refold with each extension and contraction of the sarcomere.

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