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# Assessment of cardiomyocyte maturity using micromachined cantilever devices with different electrical conductivities

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## Abstract

Electroconductive materials provide a useful platform for cell culture in vitro environments due to their inherent conductivity and electrical activity. In this paper, we evaluate the maturity of cardiomyocytes using contraction force according to the electroconductive materials and substrate, and quantitatively analyzed the change of the contraction force according to the drugs. To align the cardiomyocytes, groove structures were integrated on three different substrates: Polydimethylsiloxane (PDMS), Polyimide (PI), and SU-8 were fabricated to analyze the maturity of cardiomyocytes according to various substrates. The highest  $\alpha$ -actinin protein expression and sarcomere length of 1.97  $\mu\text{m}$  was measured on SU-8 with 3  $\mu\text{m}$  groove substrate. After the gold coating, western blot was conducted to increase the expression of the Connexin 43 and Vinculin proteins and induced the maturation of cardiomyocytes. Finally, SU-8 cantilever array was fabricated to analyze maturity of cardiomyocytes using contraction force according to electroconductive material and drugs. It is expected that drug toxicity assessment of mature cardiomyocytes will be possible through the measurement of the contraction force of cardiomyocytes, which varies with structural and electroconductive materials.

**Keywords:** Cardiomyocytes, Cantilever, Contraction force, Drug toxicity, Electroconductive material

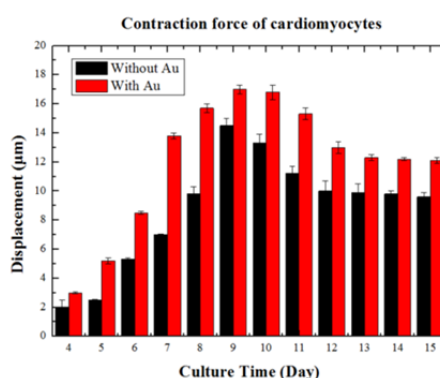


Figure. The displacement of the SU-8 cantilever W & W/O gold coating; over cell culture time

## References

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