

Supplementary data

Superior crack initiation and growth characteristics of cellulose nanopapers

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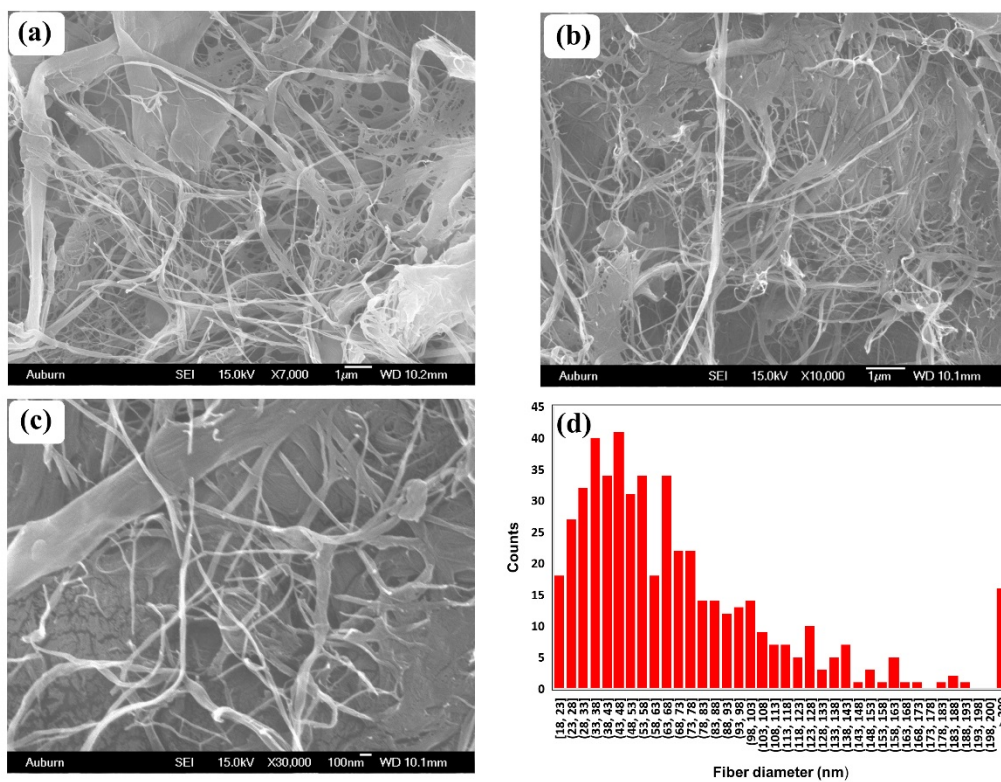


Figure S1 (a-c) SEM images of the CNF used in this study with different magnifications, (d) the corresponding distribution of nanofiber diameters.

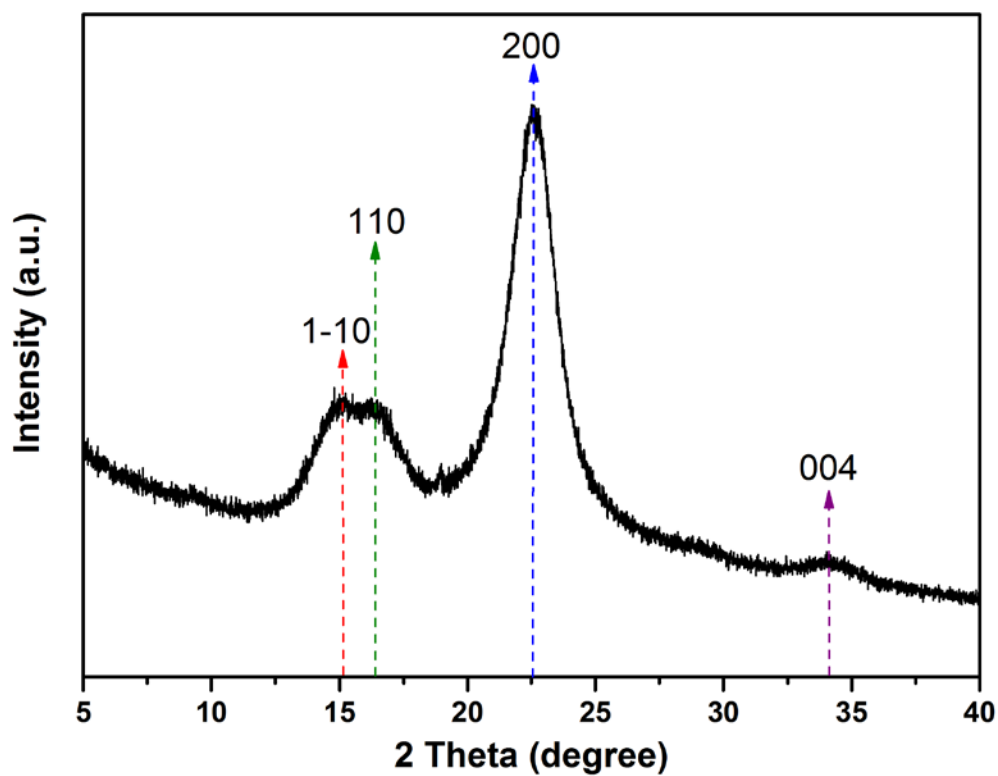


Figure S2 XRD pattern of the CNF used in this study.

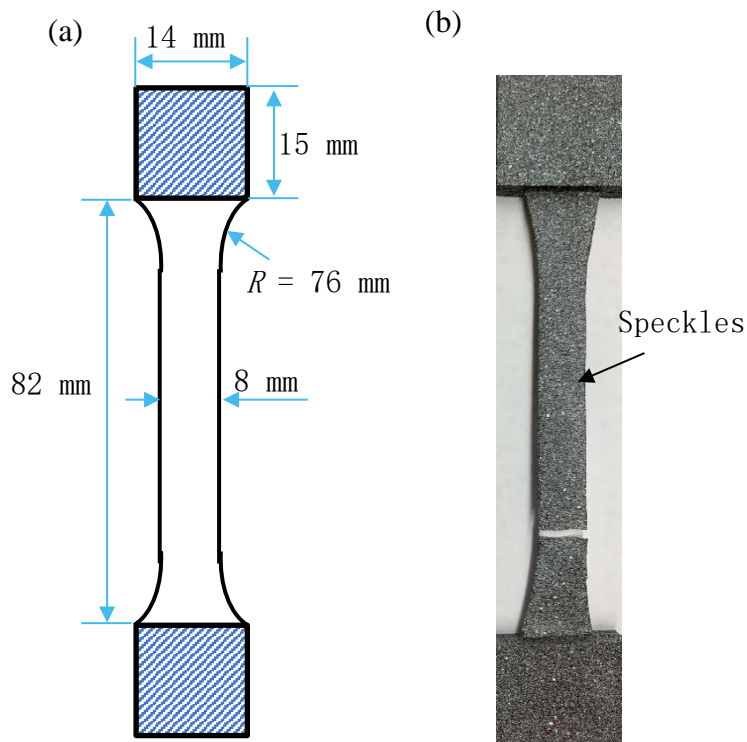


Figure S3 Specimen for tension test: (a) schematic, (b) specimen with polycarbonate end-tabs and sprayed-on black/white random speckles.

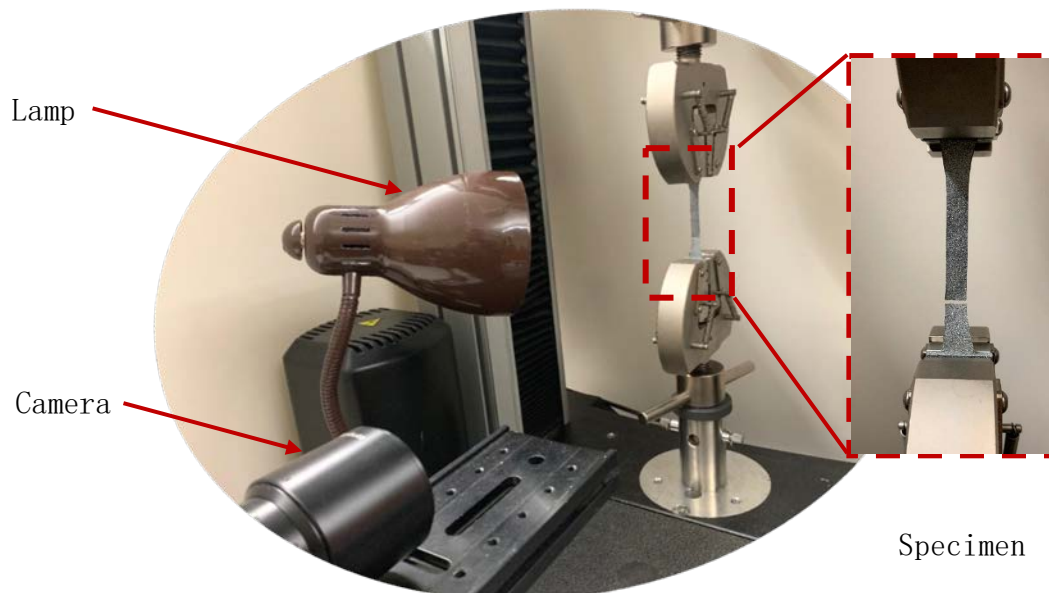


Figure S4 Experimental setup used for tension tests. The inset shows close-up view of specimen with sprayed-on black/white random speckles.

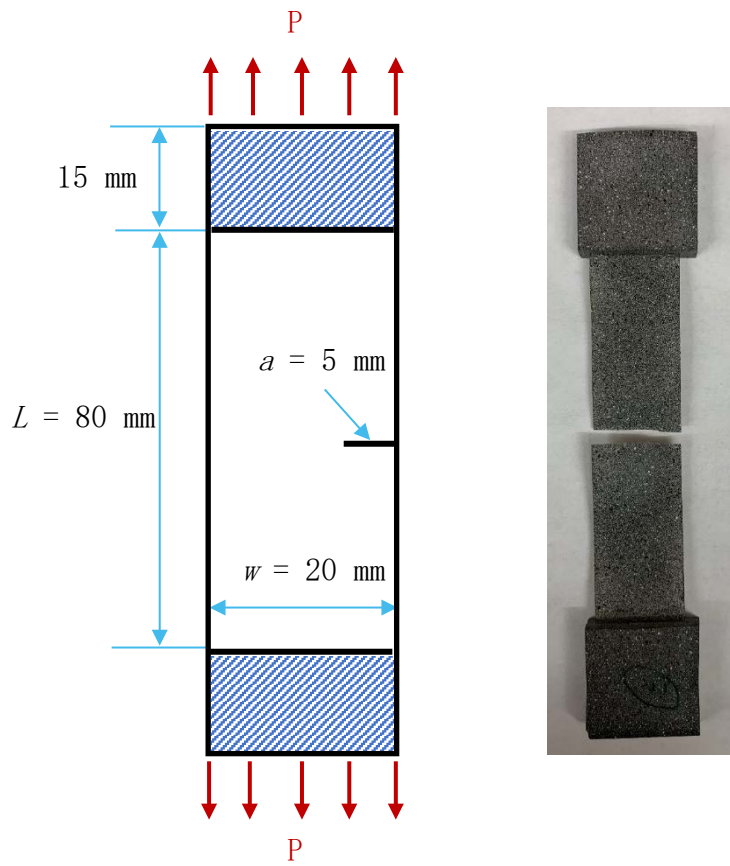


Figure S5 Specimen for quasi-static fracture test: (a) schematic (end-tabs are shaded) (b) fractured specimen with polycarbonate end-tabs and coated with random black/white speckles.

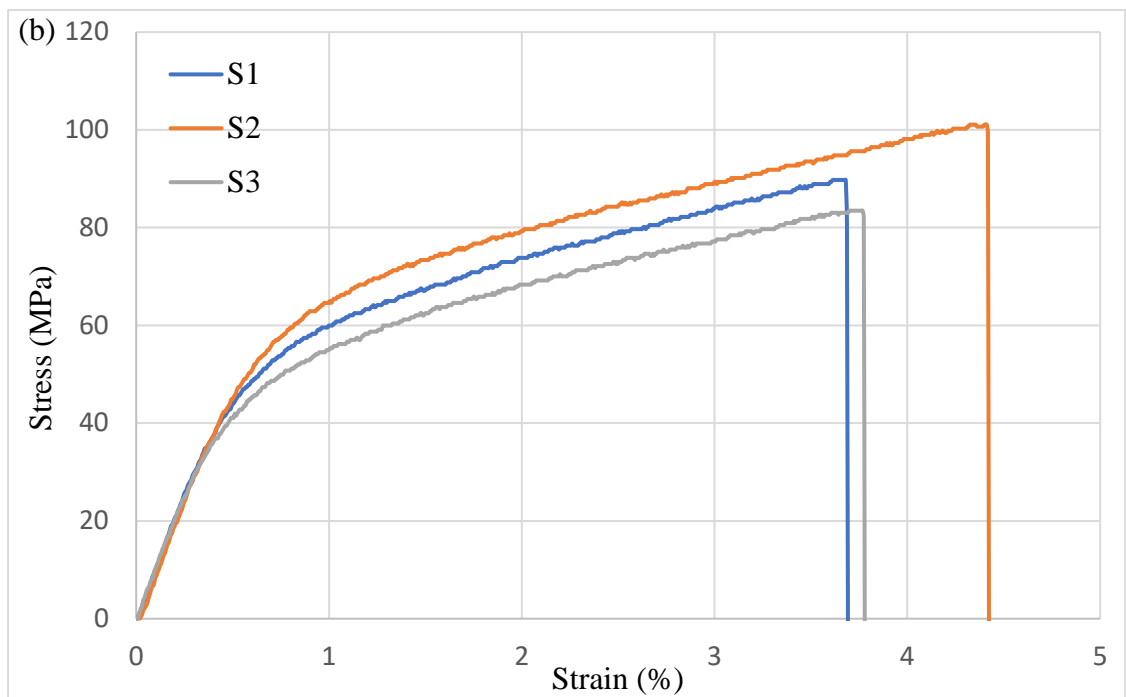
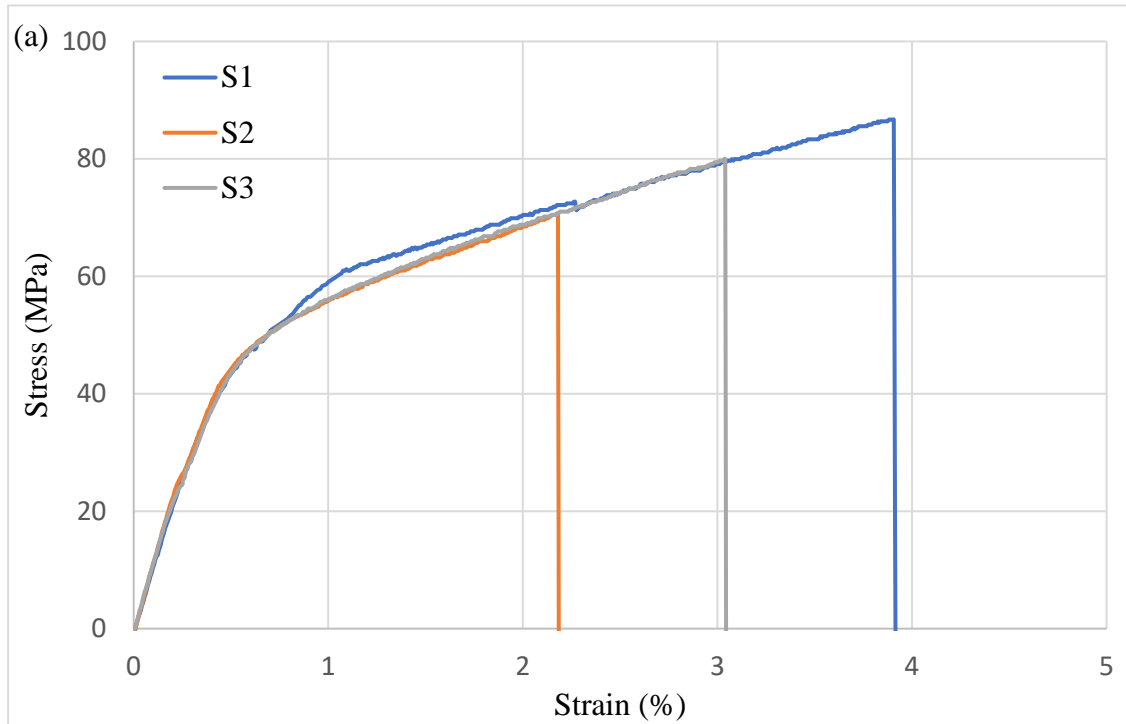


Figure S6 Stress-strain response from three tension tests for (a) C-CNP, (b) F-CNP.

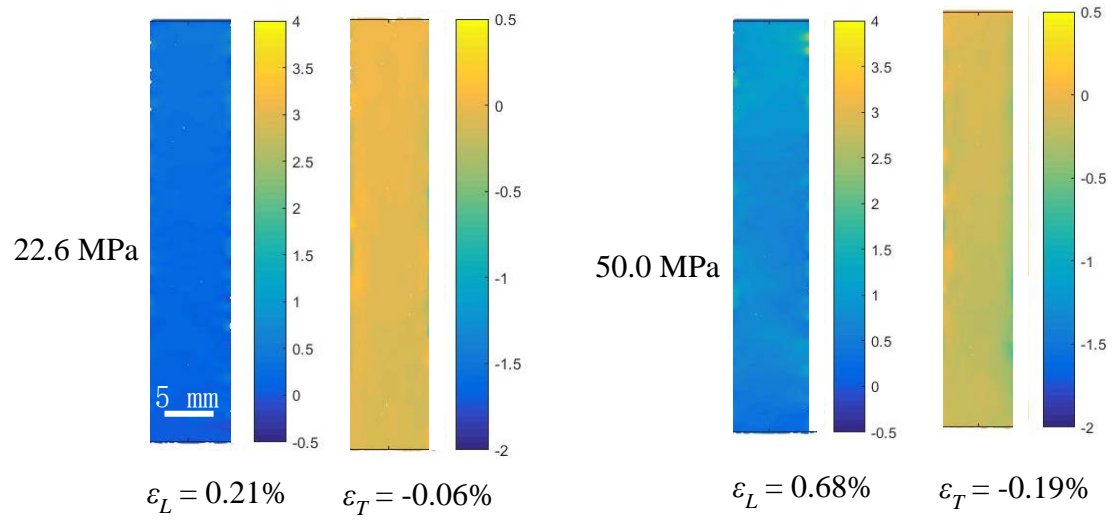


Figure S7 Strain fields measured from 2D-DIC (Left column: longitudinal strain along the loading direction; Right column: transverse strain) of specimen S2 for C-CNP at two stress levels.

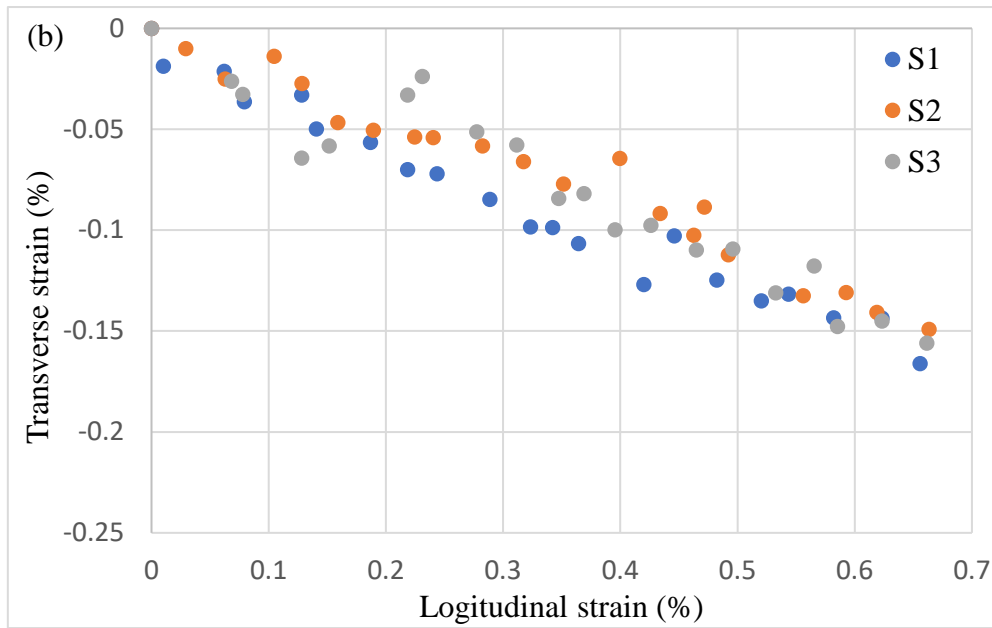
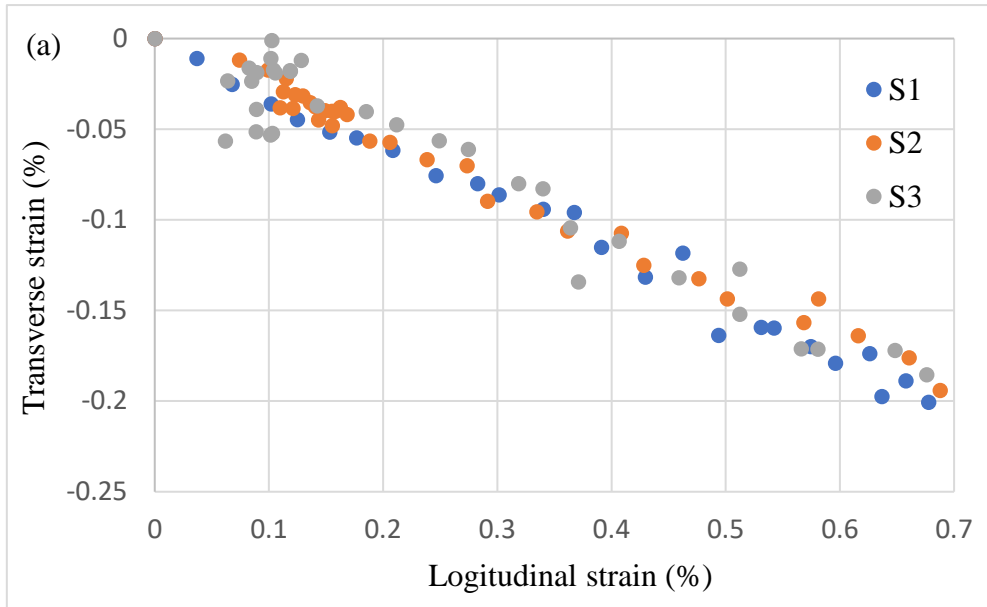


Figure S8 Transverse strain-longitudinal strain responses from three tension tests for (a) C-CNP, (b) F-CNP.

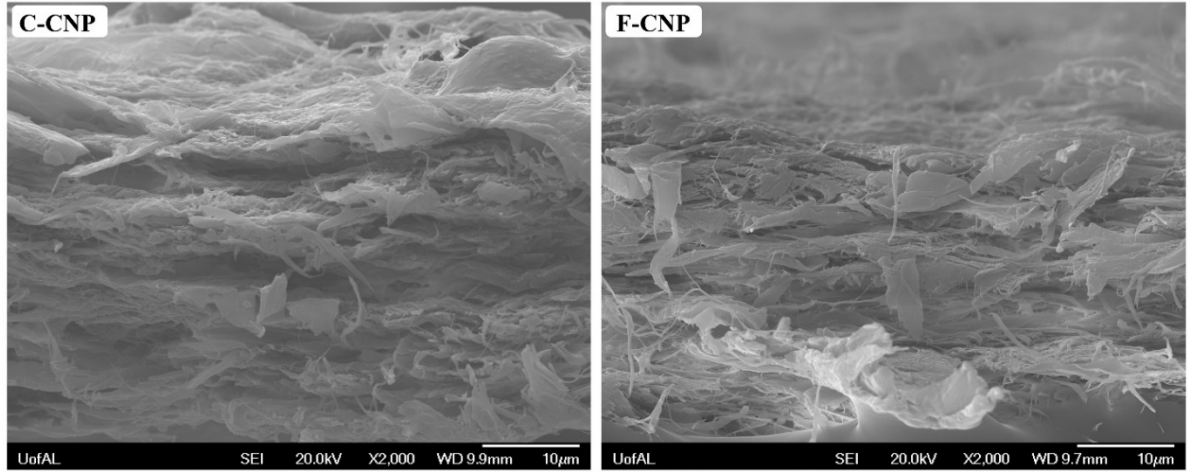


Figure S9 SEM of fractured surfaces (*x-z* plane, as shown in **Fig. 5**) of C-CNP and F-CNP.

Table S1. Density (kg/m^3) of C-CNP and F-CNP

	Test 1	Test 2	Test 3	Average	Standard deviation
C-CNP	1075	1100	1045	1073	28
F-CNP	1242	1183	1250	1225	37