

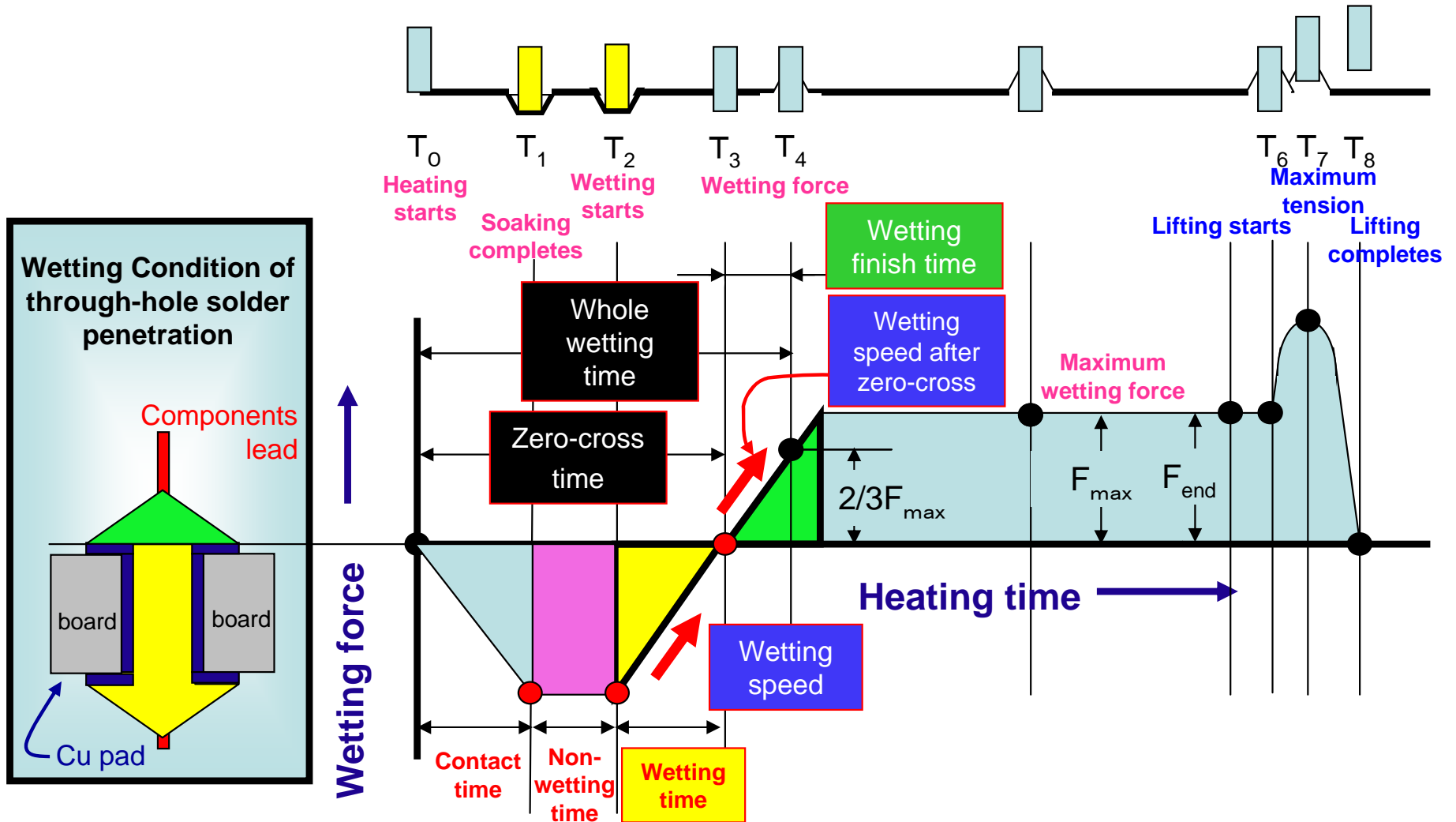
# SN100C- High First Pass Yield

# Excellent Wetting Properties



SN100C is an excellent lead-free solder that offers *high first pass yield*, reliable joints and economical operation. We will explain how the excelling wetting properties of SN100C are revealed in a correctly interpreted wetting balance test.

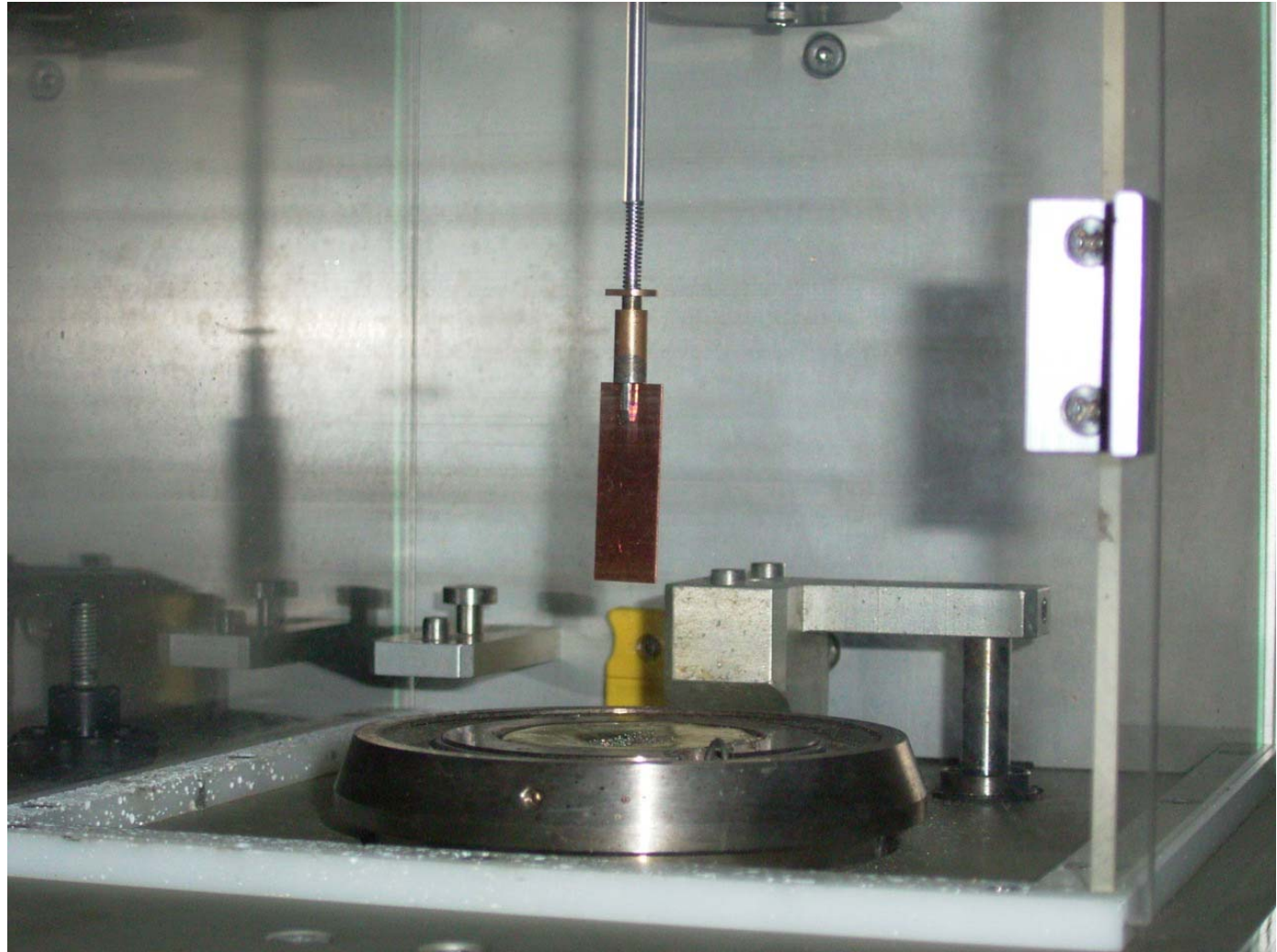
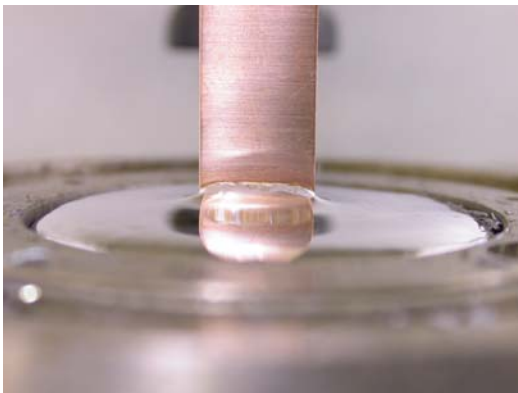
# Wetting Test (Wetting Balance Method)



➔ Total wetting time consists of the immersion period( $t_1$ ), an incubation period( $t_2$ ), the interval to zero wetting force( $t_3$ ), and then interval to  $2/3 F_{max}$ ( $t_4$ ). During the interval to  $t_3$  solder penetrates to the top of the through hole. During the interval  $t_4$  the solder rises above the pad to form the topside fillet. These two measures of solderability,  $t_3$  and  $t_4$ , are therefore very important in determining the success of through-hole soldering.

## Wettability Test

Wetting Balance Method  
Machine  
SWET-2100  
(Tarutin Kester Co., Ltd.)



We measured the wetting period, to zero net force and then to maximum wetting force with the SWET-2100 by Tarutin Kester Co., Ltd.

## Test Condition (1)

- Test piece : Copper plate (C1220P)  
(width 10mm、length 30mm)
- Solder alloy : SN100C、Sn-3.0Ag-0.5Cu
- Flux : NS-831
- Melting point : 255 °C
- Immersion time : 10 sec.
- Contact depth : 2 mm
- Contact speed : 5 mm/sec.
- Contact time : 2 mm/sec.

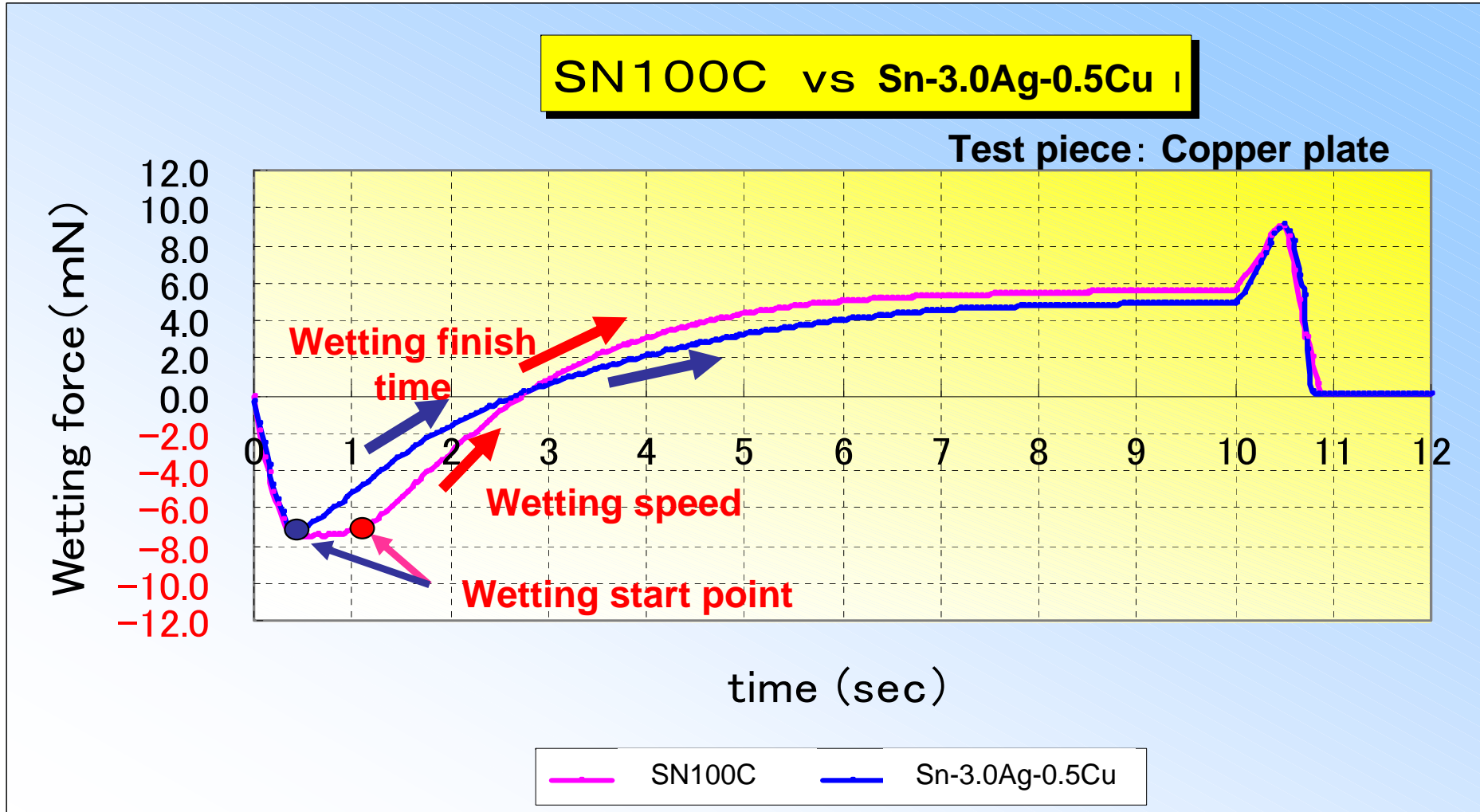


Test piece : Copper plate



We compared the wetting properties of SN100C with those of Sn-3.0Ag-0.5Cu using a copper coupon as the wetted substrate.

# Result of Wetting Test (1)

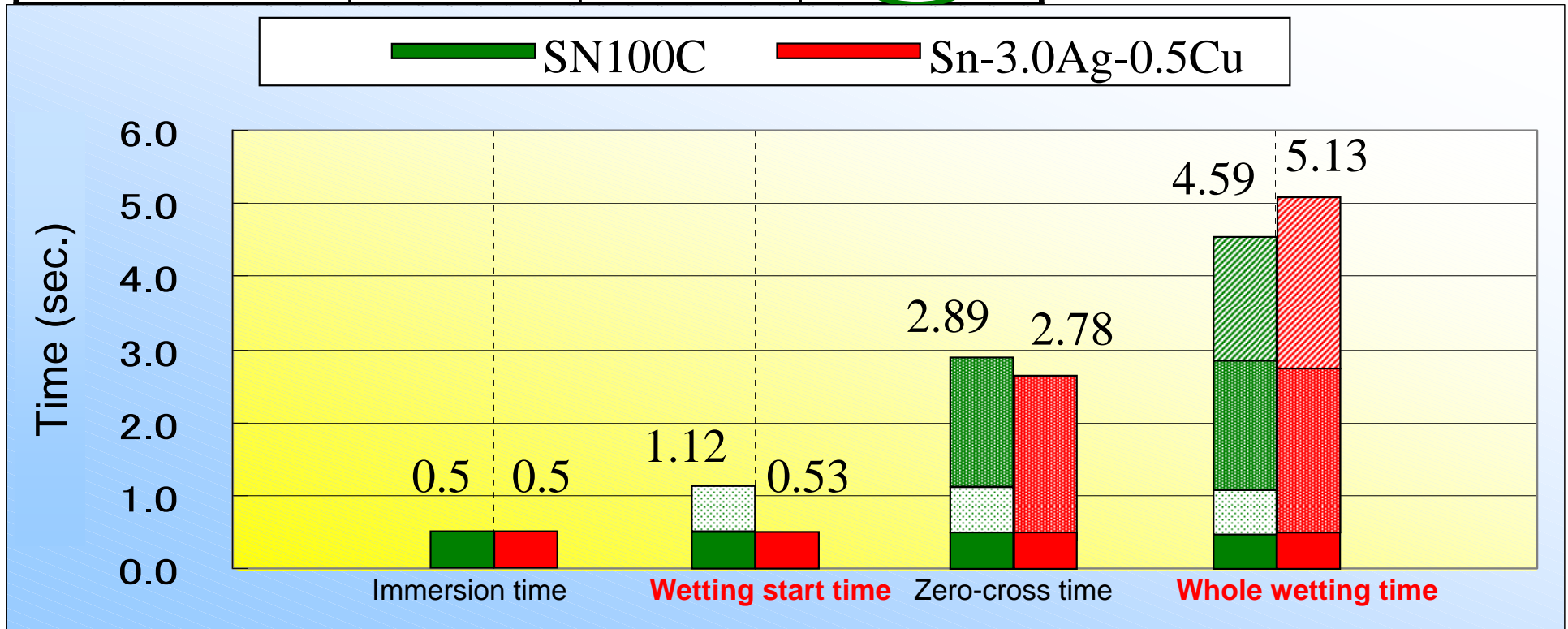


➔ Although, because its melting point is higher by 10°C, SN100C takes a little longer than Sn-3.0Ag-0.5Cu to start wetting its total wetting time is shorter. Once it starts wetting the total of the time from the onset of wetting (T2) to the zero crossing time (T3) and the time from zero crossing time to 2/3 Fmax (T4) is shorter.

# Comparison of Wetting Time & Wetting Finish Time

	SN100C	Sn-3.0Ag-0.5Cu	SN100C/ Sn-3.0Ag-0.5Cu
Non-wetting time (sec)	0.62	0.03	2067%
Wetting time (sec)	1.77	2.25	79%
Wetting finish time (sec)	1.70	2.35	72%

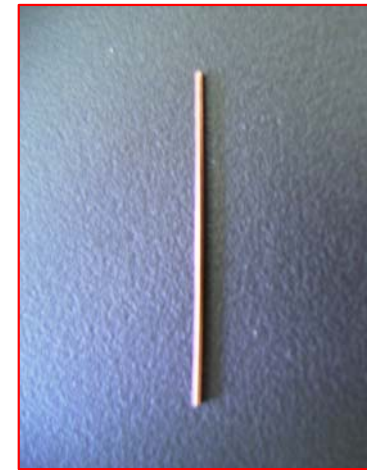
The wetting rate of SN100C after zero-crossing is faster than that of Sn-3.0Ag-0.5Cu by more than 20%.



➔ The wetting rate of SN100C after zero-crossing is faster than that of Sn-3.0Ag-0.5Cu by more than 20%. Although the wetting rate of SN100C slightly lags Sn-3.0Ag-0.5Cu from the onset of wetting to the point of zero crossing the total wetting time is shorter by about 10%.

## Test Condition (2)

- Test Piece : Cu wire (W. diameter 0.6mm、Length 30mm)
- Solder alloys : SN100C, SC(Sn-Cu), SCN(Sn-Cu-Ni),  
SCNP(Sn-Cu-Ni-P), SC0.3A(Sn-Cu-0.3Ag),  
SCAB(Sn-Cu-Ag+Bi)
- Flux : JIS Standard Flux B (Specifically for wetting test)
- Melting point : 255 °C
- Immersion time : 10 sec.
- Contact depth : 2 mm
- Contact speed : 2 mm/sec.
- Lifting speed : 2 mm/sec.



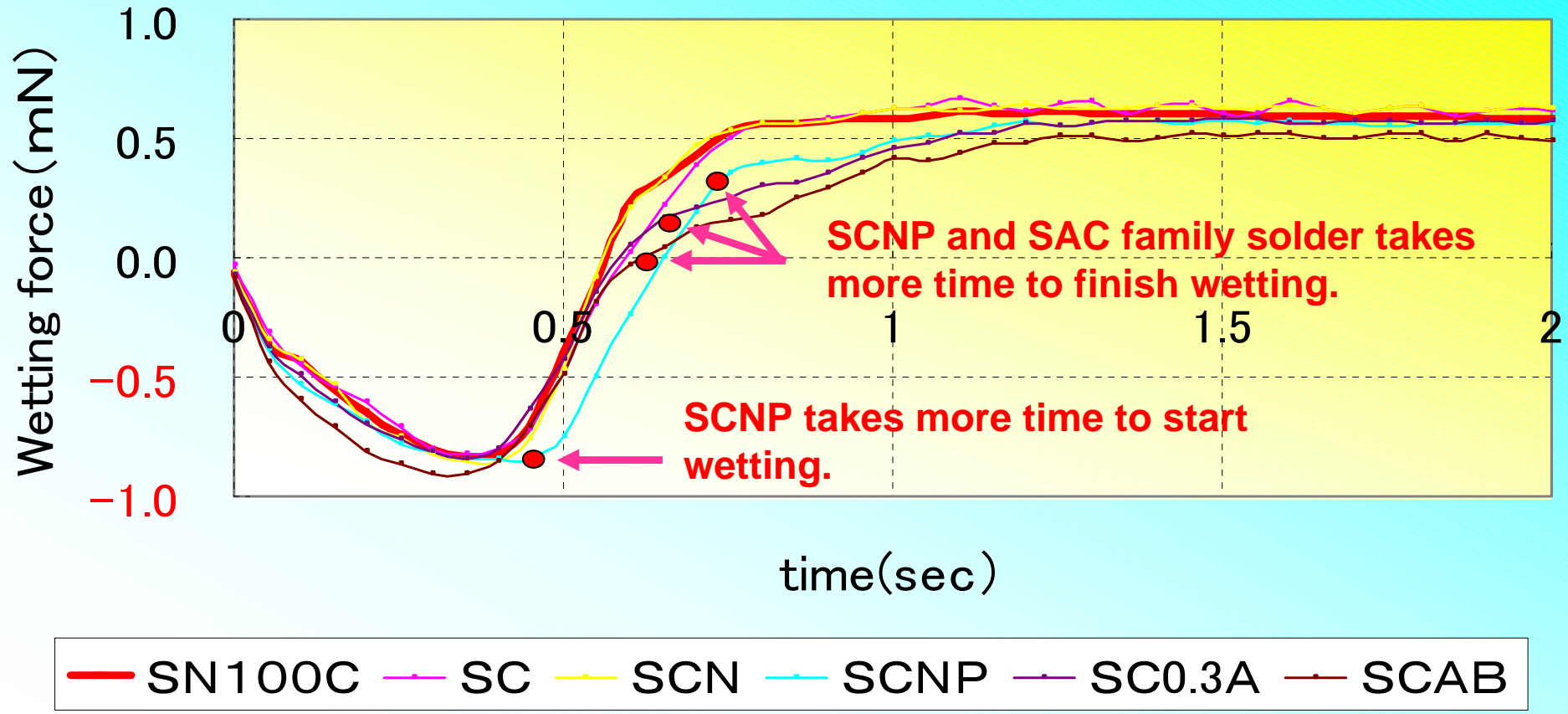
Test piece : Copper wire



We compared 6 kinds of alloys based on the Sn-0.7Cu eutectic using copper wire as the wetted substrate.

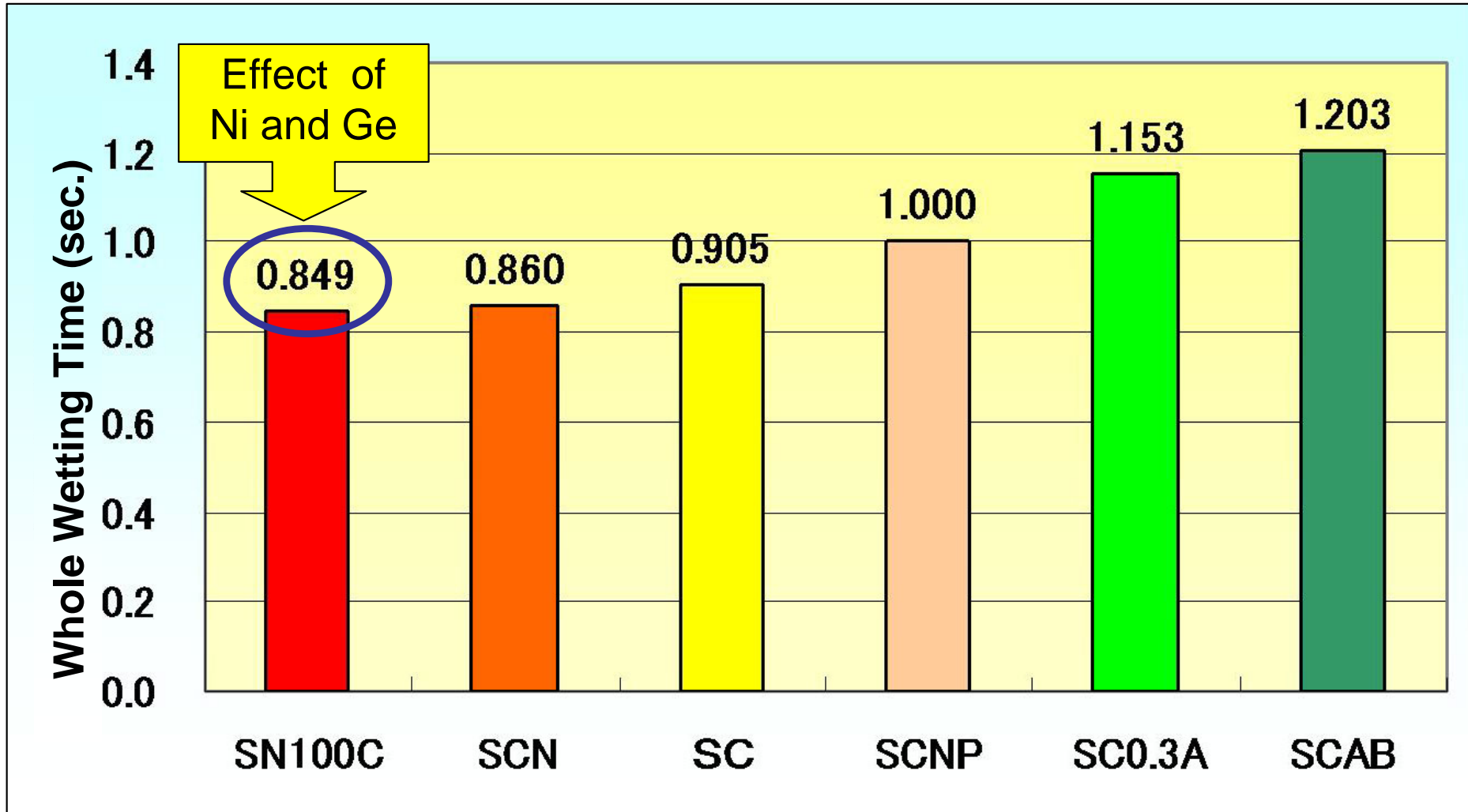
# Result of Wetting Test (2)

Wettability of SCN family solder



➔ For the SnCuNi alloy with a P addition (SCNP) wetting starts later than does SN100C. For the Sn-Cu-0.3Ag alloy the interval to 2/3 Fmax is longer than that for SN100C.

# The Result of Evaluation of Whole Wetting Time



➔ Of the six alloys based on the Sn-0.7Cu eutectic that were tested SN100C, which has controlled additions of Ni and Ge, is the fastest to wet through to 2/3 Fmax once wetting has started.