Adhesive Mechanism

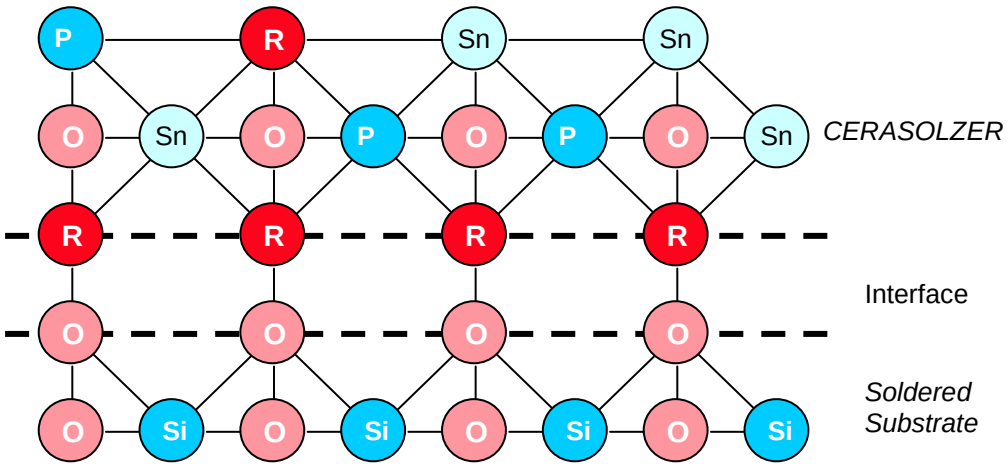
Chemical effect with active solder alloy **„CERASOLZER“**
(valid for soldering on glass, ceramics and metal oxides)

Although it is quite difficult to completely explain the mechanism of how CERASOLZER adheres to materials, these mechanisms are qualitatively understood as follows:

Since the adhesive property of CERASOLZER is essentially based upon the characteristics of the alloy, the ultrasonic vibration is merely applied to help its bonding process. CERASOLZER contains a little amount of such elements as Zn, Ti, Si, Al, Be, and Rare Earth which have a strong chemical affinity with oxygen. these metals are thought, during the bonding process, to combine with oxygen in air to form oxide, which is chemically bound to the surface of the glass, ceramics, metal oxide, etc. Thus, CERASOLZER bonding process proceeds under the liquid-solid reaction between oxides themselves. Such adhesive mechanism has been already confirmed in other areas of glass-metal bonding such as vacuum tube sealing.

Accordingly, if oxygen is completely eliminated by substituting the air surrounding the bonding equipment with an inactive gas, e.g., nitrogen, the adhesive power of CERASOLZER will be lost. It has been experimentally found that the critical oxygen concentration for adhesive power is about 2%.

A model of chemical binding between CERASOLZER and the substrate is illustrated below.



When quartz glass is used, the metallic oxides (R, O), which are components of CERASOLZER **unite chemically** with the SiO_2 (M) of glass.

Alloy # GS155

Melting Point (Cº) .....106 ~ 166
Specific Gravity 7,1

Content	***%***
Tin	58
Antimony	4
Zinc	3
Indium	35
Al, Ti, Si, Cu	

Alloy # GS182

Melting Point (Cº) .....145 ~ 203
Specific Gravity 7,1

Content	***%***
Tin	70 ~ 80
Antimony	3 ~ 5
Zinc	3 ~ 5
Indium	15 ~ 25
Al, Ti, Si, Cu	

Alloy # GS217

Melting Point (Cº) .....199 ~ 217
Specific Gravity 7,3

Content	***%***
Tin	94 ~ 96
Antimony	3 ~ 5
Zinc	1 ~ 3
Al, Ti, Si, Cu	

Alloy # CS186

Melting Point (Cº) .....186 Eutectic
Specific Gravity 8,9

Content	***%***
Tin	60
Lead	35
Zinc	
Antimony	
Al, Ti, Si, Cu	

Alloy # CS224

Melting Point (Cº) .....224 Eutectic
Specific Gravity 9,7

Content	***%***
Tin	40
Lead	55
Zinc	
Antimony	
Al, Ti, Si, Cu	

Alloy # CS246

Melting Point (Cº) .....246 Eutectic
Specific Gravity 10,1

Content	***%***
Tin	30
Lead	65
Zinc	
Antimony	
Al, Ti, Si, Cu	

Alloy # CS297

Melting Point (Cº) .....297 Eutectic
Specific Gravity 10,2

Content	***%***
Tin	5
Lead	90
Zinc	
Antimony	
Al, Ti, Si, Cu	

Alloy # GS-200ALU

Melting Point (Cº) .....198 Eutectic
Specific Gravity 7,3

Content	***%***
Tin	85
Zinc	13
Al, Ti, Si, Cu	

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Alloy # GS220

Melting Point (Cº) 221-230
Specific Gravity

Content	***%***
Sn	92
Ti	3
Ag	3
Ce, Ga, Sb, Cu, In, As, Ni, Zn	Rest / Balance
Pb	<0,001
Cd	<0,001
Fe	<0,001