



Industrial Consultancy & Sponsored Research (IC&SR)

Hard Particle Mixed Silver-Copper Based Brazing Filler Material for Joining Diamond to Steel Substrate

IITM Technology Available for Licensing

PROBLEM STATEMENT

- ❖ **Diamond is used in super-abrasives** for cutting/grinding tools like grinding wheels, dressing and truing tools, and honing discs.
- ❖ **Electroplating** or brazing technology is used to join diamond grits with a metal substrate.
- ❖ Brazing technology offers superior joint strength by developing a chemical bridge at the grit-alloy interface.
- ❖ Diamonds **metastable at higher temperatures** can deteriorate cutting edge sharpness and cause micro-cracks.
- ❖ Low melting temperatures and soft or ductile-based filler alloys are suggested to address these issues.
- ❖ Active **Ag-based** filler alloys have **lower hardness value**, leading to inferior abrasion resistance.
- ❖ **Need for improved filler alloy formulations** and silver-copper-based filler material for diamond to steel substrates.

TECHNOLOGY CATEGORY MARKET

Technology: Filler Material For Joining Diamond to Steel Substrate

Category: Assistive, Test Equipment & Design Manufacturing

Industry: Abrasive Manufacturers, cutting tool Manufacturers

Application: Machining operation

Market: The global market size estimated at **USD 47.34 billion in 2024**, and is expected to reach **USD 66.83 billion by 2029**, growing at a **CAGR of greater than 5%** during the forecast period (2024-2029).

INTELLECTUAL PROPERTY

IITM IDF Ref. 1707

Patent No: IN 461065

TRL (Technology Readiness Level)

TRL- 4, Experimentally validated in Lab;

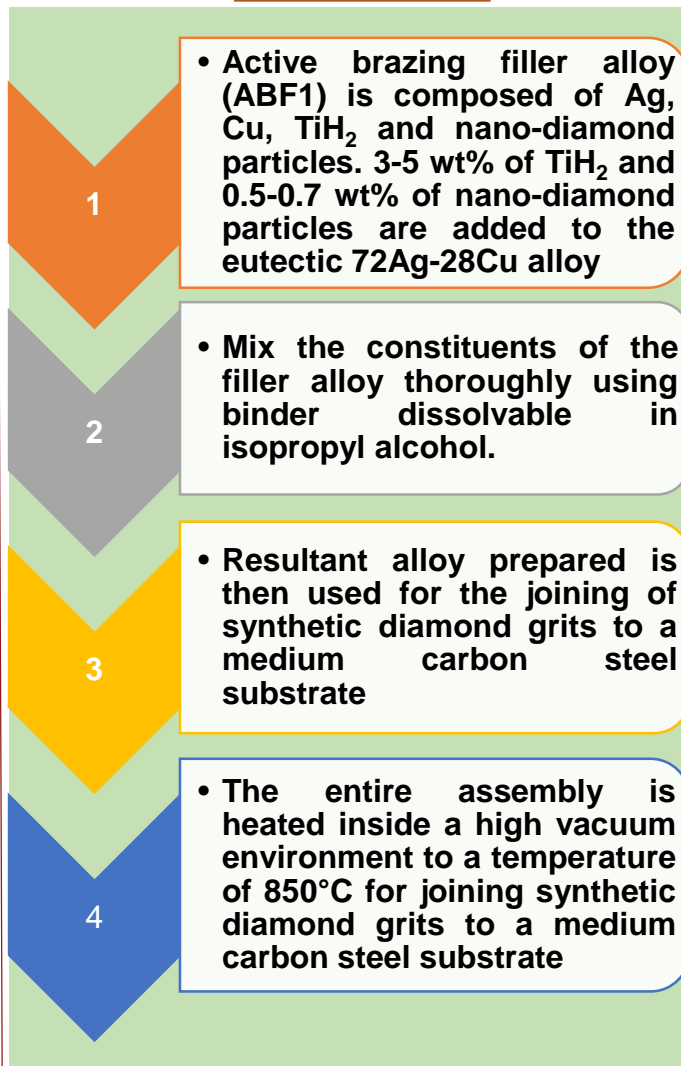
Research Lab

Prof. Amitava Ghosh
Dept. of Mechanical Engineering

TECHNOLOGY

Formulation of active brazing filler alloy (ABF1)

Flow Chart 1



CONTACT US

Dr. Dara Ajay, Head TTO
Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

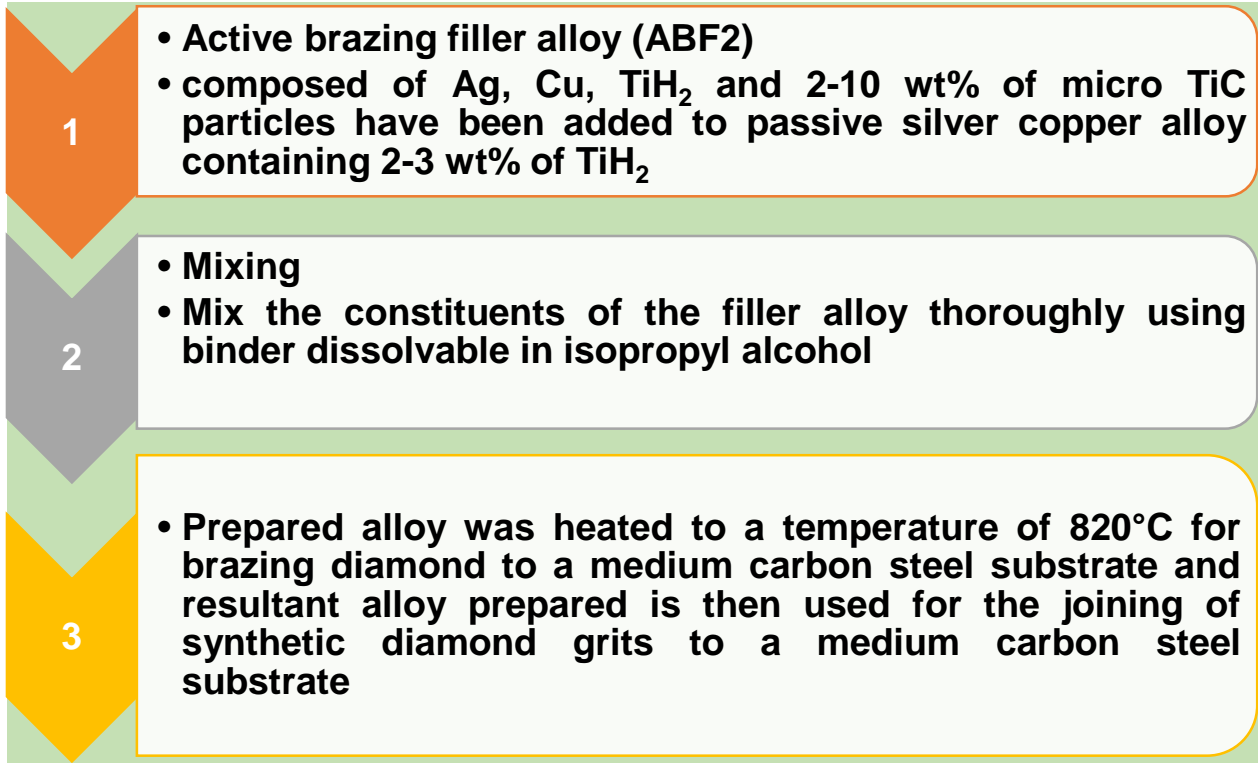
IITM TTO Website:
<https://ipm.icsr.in/ipm/>

Email: smipm-icsr@icsrpis.iitm.ac.in
sm-marketing@imail.iitm.ac.in
Phone: +91-44-2257 9756/ 9719



Formulation of active brazing filler alloy (ABF2)

Flow Chart 2



Key Features / Value Proposition

❑ Filler Material

❖ Vacuum Level

➤ The filler material wherein the vacuum level maintained during the brazing process was in the range of **10⁻⁶ to 10⁻⁷ mbar**.

❖ Heating Temperature

➤ The filler material wherein the entire assembly is heated inside a high vacuum environment to a temperature of **850 °C**.

❖ Wear Resistance

➤ The filler material wherein the nano-diamond added filler demonstrates **wear resistance** property by **50-60%** and the brazed joint strength is **reduced by 30-40%**

❖ Abrasion resistance

➤ Filler alloy exhibited a significant increase in the **abrasion resistance** property by about **73-91%** and the brazed joint strength was reduced by an extent of **20-30%**

CONTACT US

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Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

IITM TTO Website:
<https://ipm.icsr.in/ipm/>

Email: smipm-icsr@icsrpis.iitm.ac.in

sm-marketing@imail.iitm.ac.in

Phone: +91-44-2257 9756/ 9719