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PROJECT BRIEF

Binder Removal from Noble Metal and Base Metal Multilayer Ceramic Capacitors

Brandon Abeln, Stephen J. Lombardo, and Fatih Dogan

Objectives:

i) Remove binder rapidly from green ceramic components using a supercritical extraction cycle (SCE) followed by a thermal cycle (TC)

ii) Evaluate supercritical extraction on the residual carbon content of base metal electrode (BME) multilayer ceramic capacitors (MLCs)

Applications and Benefits:

- Supercritical extraction of binder components may lead to open porosity, which will facilitate the subsequent thermal removal of remaining binder
- Supercritical extraction can be applied to any binder system, and may reduce cycle time and increase yield
- Supercritical extraction may lead to less residual carbon in base metal capacitors

Average percent residual carbon (R.C.) in MLCs with and without Ni electrodes after undergoing either a combined SCE/TC cycle or a TC alone.

	R. C. With Ni at 270 °C	R. C. Without Ni at 270 °C
TC	0.272 ±0.104	0.304 ±0.066
SCE/TC	0.199 ±0.007	0.224 ±0.006

Defect comparison between a combined SCE/TC to a TC alone for polyvinyl butyral-based MLCs subjected to various heating rates inside a box furnace.

Lamination Temp. (°C)	TC (°C/min)	Failure (Y/N)	SCE/TC (°C/min)	Failure (Y/N)
85	7.5	Y	7.5	N
95	10	Y	10	N

Project Future:

- Evaluate strategies to increase the solubility of binder components during supercritical extraction
- Develop rapid thermal cycles to remove the remaining binder
- Evaluate the effect of supercritical extraction on residual carbon content in noble metal capacitors

Center for Dielectric Studies

Department of Chemical Engineering
University of Missouri
Columbia, MO 65203

For more information contact:
Prof. Steve Lombardo
Phone: (573) 884-1644
Email: lombardos@missouri.edu