GENERAL PROCESS AND OPERATION SPECIFICATION

BIDTEC SP100 Spin Coater

I. SCOPE
   a. The purpose of this document is to describe requirements and basic operating instructions for the BIDTEC SP100 Spin Coater. This tool is intended for coating photoresist on samples of various sizes.

II. SAFETY
   a. Be sure that you are trained and signed off to use this equipment. (Usually a part of the EVG 610 Mask Aligner training).
   b. Be sure to keep the bowl lid closed before beginning operation. The lid is equipped with an interlock switch that prevents operation of the spinner if the lid is not closed.
   c. The red switch on the Master controller allows the operator to stop the spinner during run mode.
   d. If you are unsure about any procedure or indication while operating this equipment be sure to contact a staff member or trainer for assistance.

III. APPLICABLE DOCUMENTS, MATERIALS AND REQUIREMENTS
   a. For more information about the detailed operation of this tool refer to the BIDTEC factory manual – "Instruction Manual for the SP100 Spin Coater/Developer" File name: BIDTEC SP 100 Spin Manual.pdf. (Ask AggieFab staff for a copy)
   b. Appendix A: Definition of keypad buttons
   c. Appendix B: Definition of display variables
   d. Appendix C: Various types of chucks
   e. Appendix D: Spin curve for AggieFab provided photoresists

IV. OPERATION
   a. Turn on the power supply switch located in the back left hand side of the Master controller.
   b. Turn on the vacuum switch on the inner left side of the spin coater.
   c. Preparing the spin coater bowl
      i. Grab a sheet of aluminum foil and line the bowl of the spin coater.
      ii. Make sure to puncture a small hole in the middle of the aluminum foil to let the chuck through.

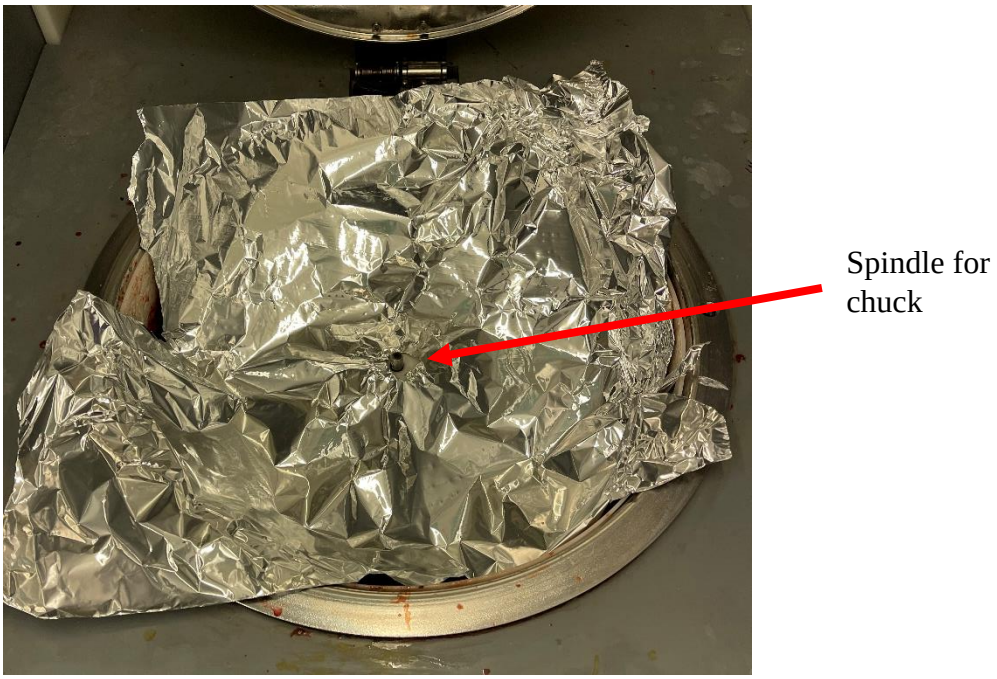


Figure 1: Aluminum covering bowl

d. Place the desired chuck on the spindle in the center of the bowl.
    i. Make sure to select a chuck that has a vacuum O-ring and its size is smaller than your sample so resist does not go into the vacuum.
        1. The spindle is a cylinder with a flat edge and the hole on the bottom of the chucks have a flat edge that match the spindle.
        2. To ensure a tight fit, be sure to align the flat edge of the spindle with the flat edge of the chuck and then push down on the chuck to secure it tightly.
        3. (Note: some chucks have a worn down flat edge so it may look more rounded than usual)
e. Place your sample on the chuck.
    i. Center your sample on the chuck as best as possible, then close the lid and press the green start button to check for any wobbling. If the sample wobbles, press the red stop button and adjust accordingly.
    ii. The spin coater lid has several holes that allow users to see the sample.
f. Preparing photoresist.
    i. Before applying photoresist to the sample, grab a plastic bag and a pipette from the cabinet under the spin coater.
    ii. Use the pipette to take photoresist from out of the bottle. Make sure that the end of the pipette is neither on the surface of the liquid nor at the bottom of the bottle. Take photoresist from the middle of the liquid to remove unwanted bubbles from forming.

g. Applying photoresist.
    i. Starting from the center of the sample, slowly apply the photoresist to about 90-95% of the sample reaching the edges.
    ii. If the photoresist is concentrated in the center of the sample, then streaks will form towards the edges which results in an uneven layer of photoresist.
    iii. When you are done applying photoresist, be sure to squirt any excess photoresist in the pipette into the aluminum foil surrounding the bowl.
    iv. DO NOT PLACE EXCESS PHOTORESIST BACK INTO THE BOTTLE.
    v. Then, either place the pipette into the plastic bag or wrap it in the aluminum foil covering the bowl.
    vi. Close the lid.

Figure 2: Wrapped Pipette

h. Setting Spin Coater parameters
    i. Begin by selecting “setup” on the Master controller.
    ii. Select the desired recipe number (choose from 0-9)
    iii. Press 1 on the keypad for parameter set up.
        1. Enter Speed #1
        2. Enter Acceleration rate to reach Speed #1
        3. Enter Timer #1
            a. This is how long it will spin at speed #1
        4. Enter Speed #2
        5. Enter Accel/Decel rate for Speed #2

        a. Accel/Decel depends on if speed #2 is higher or lower than Speed #1
    6. Enter Timer #2
        a. Note: To bypass Speed #2 and Timer #2, simply set the Speed #2 the same as Speed #1 and Timer #2 to zero.
    7. Enter Final Speed
        a. Generally the final speed is zero
    8. Enter Accel/Decel speed for Final Speed
    9. Enter Final Speed Timer
        a. Since the final speed is zero, the final speed timer along with everything after this is generally also zero.

i. If you have not already done so, place the pipette into the plastic bag.
j. Remove the chuck and place it in the shelf above the bowl.
k. Carefully remove the aluminum foil
    i. Beginning on the outside edges, curl the aluminum foil inward so that all of the photoresist is contained inside.
l. Place the aluminum foil in the plastic bag.
m. Close the lid of the spin coater.
n. Turn off the vacuum switch and the power switch.
o. Take off your gloves and place them in the plastic bag. Close it and throw it away in the trash.
p. Do not forget to put on new gloves.

V. SIGNATURES AND REVISION HISTORY

a. Author of this document: Marcelo Pier
b. Author Title or Role: Student Technician
c. Date: 3 March 2021
d. Revision: Original
e. Revision notes:

Approvals:

Technical Manager Signature:_____

Date: _____

Revision History:

Revision	**Author**	**Date**
Original Issue	M. Pier	3 March 2021

Appendix A: Definition of Keypad Buttons

“0 – 9”: Use these keys to enter the numeric values of all variables.

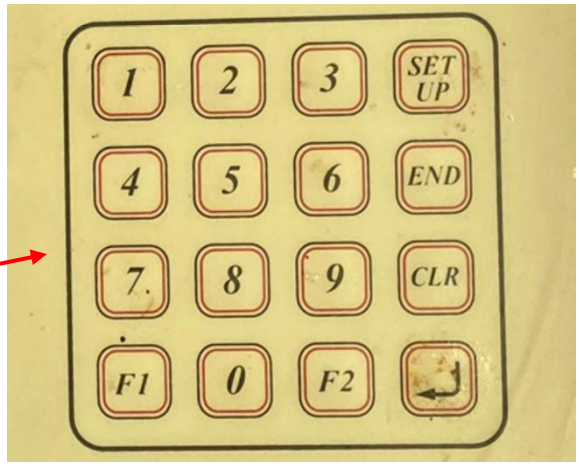
“SETUP”: Use this key to enter the setup mode.

“END”: Not Used.

“CLR”: Use this key to clear one or more entered digits.

“ ↲ ”: (ENTER) Use this key to save the values for the variable and continue to the next step. If there is no need to change any values simply press this key to keep the old value and go to the next step.

“F1 – F2”: Not Used.



Appendix B: Variables

TIMERS: All timers can be set to 0 – 999.9 seconds. To enter a time of 99 seconds, simply enter “990” and press ENTER (↲).

ACCELERATION/DECERLATION: All accel/decels can be set to 99.9 seconds. To enter a accel/decel time of 10 seconds, simply enter “100” and press ENTER (↲).

SPEEDS: All speeds can be set to 0 -7500 RPM. To enter a speed of 2000 RPM, simply enter “2000” and press ENTER (↲).

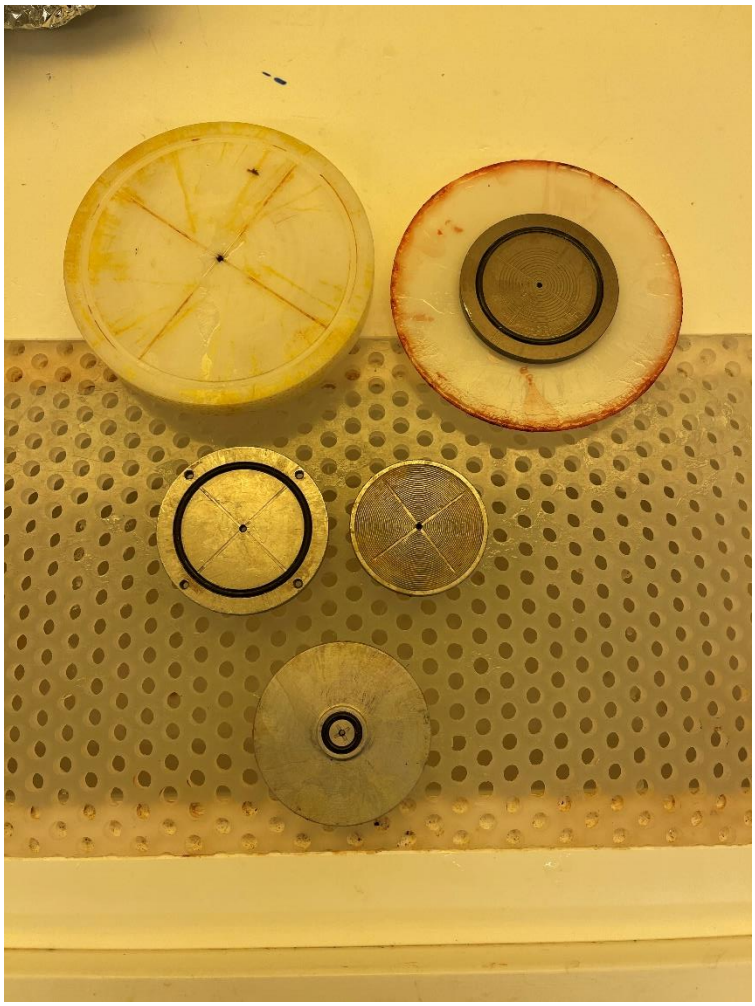
SPEED1 SELECTION: In the event that the SP100 is used only as one speed and timer, simply press “2” when system is in the SPEED 1 selection screen. Note that when bypassing this speed both speed #1 and speed #2 are bypassed.

Appendix C: Different types of chucks

Here are a few types of chucks that should be located on the inner shelf of the spin coater. The various sizes of the chucks allow for coating of various sizes of samples.

Be sure to choose a chuck that is smaller than you sample size.

For example, if you have a 2 inch wafer sample, then the chucks that are 4 inches (top row in the image below) should not be used. This is because there is chance that some photoresist can enter the vacuum.



Appendix D: Spin Curve for AggieFab provided photoresists

AggieFab provided photoresists include the following:

1. AZ 5214-E IR

Typical Process

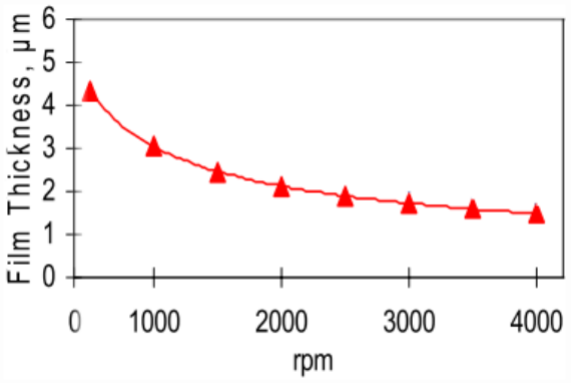
Soft Bake: 90-100C (60s)

Expose: i-line or broadband

Post Expose Bake: None

Develop: spray, puddle or immersion

Developer: AZ 300MIF or AZ Developer 1:1



AZ 5214E-IR Spin Curve

2. S1818

Table 1. Process Conditions (Refer to Figure 1)	
Substrate	Silicon
Photoresist	MICROPOSIT S1813 G2 Photoresist
Coat	12,300Å
Softbake	115°C/60 sec. Hotplate
Exposure	Nikon 1505 G6E, g-Line (0.54 NA), 150 mJ/cm^2
Develop	15 +50 sec. Double Spray Puddle (DSP) @ 21°C