

Supplementary Material

Determination of uric acid in artificial saliva with compact AMP3291 reader and Au nanoparticles modified electrode

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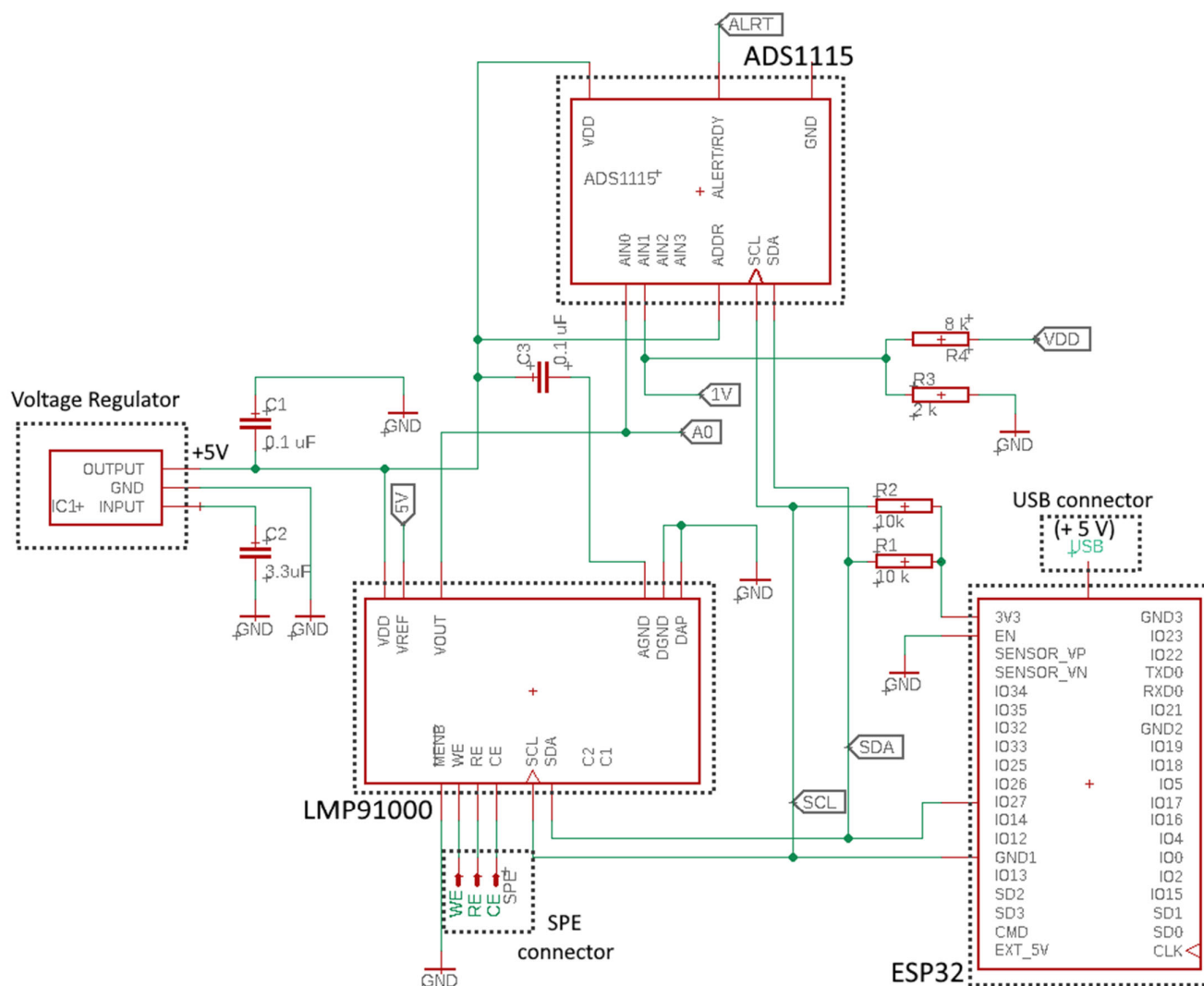


Figure S1. Schematic diagram for AMP3291 design.

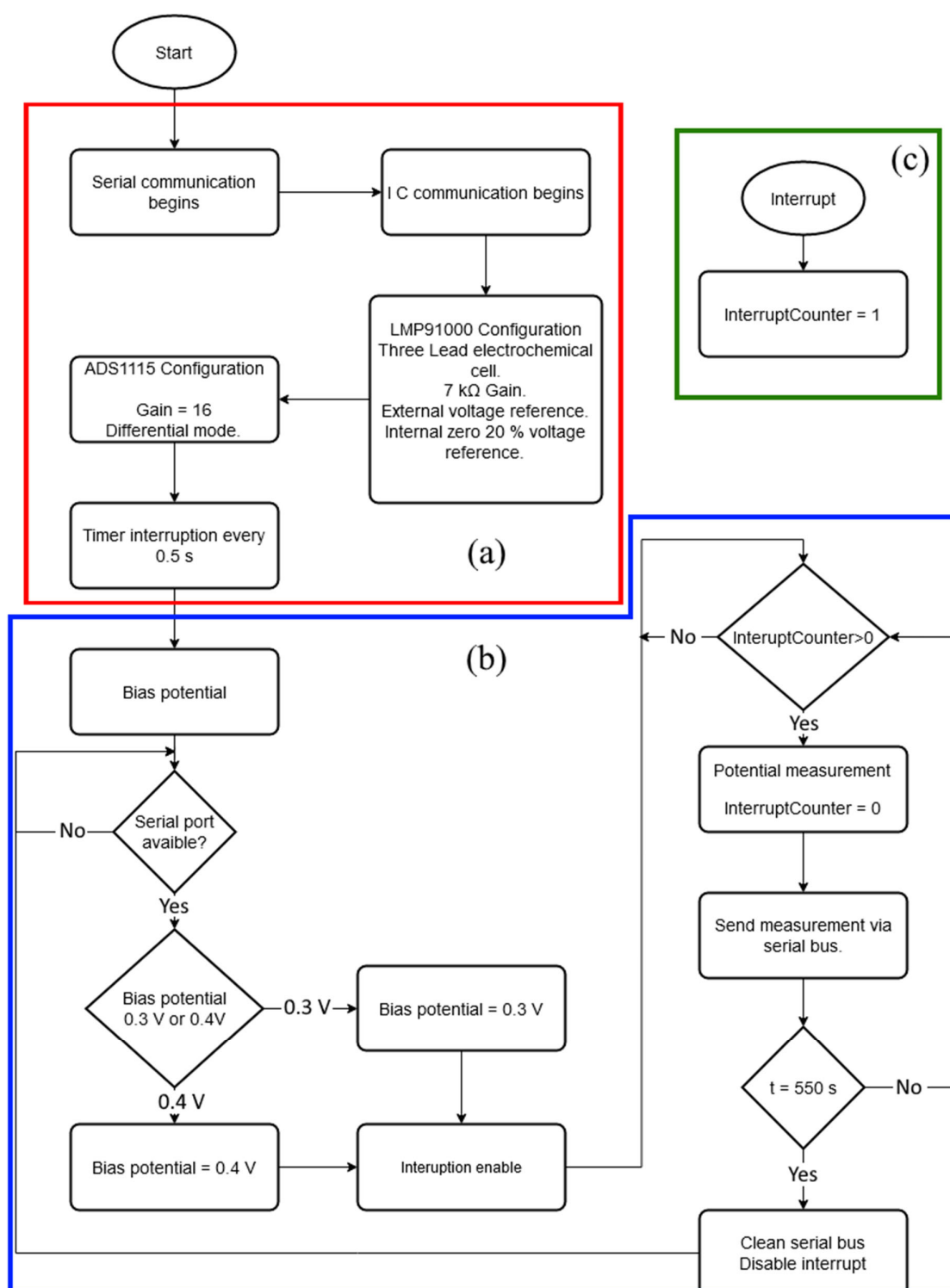


Figure S2a. General flow diagram for AM3291 operation.

```

void setup()
{
  Wire.begin(I2C_SDA, I2C_SCL, 10000); // Begin serial communication
  Serial.begin(9600);
  ads.begin(); // Initialize ADC

  ads.setGain(GAIN_SIXTEEN); // 16x gain +/- 0.256 1 bit = 0.0078125 mV

  timer = timerBegin(0, 80, true); // ESP32 clock frequency = 80 MHz
  timerAttachInterrupt(timer, &onTimer, true); // Interrupt name: onTimer
  timerAlarmWrite(timer, 500000, true); // Timer interrupt every 0.5 s

  delay(50);
  pstat.disableFEI();
  pstat.setGain(3); // Gain = 7 kΩ
  pstat.setRload(2); // Load resistance 33 Ω
  pstat.setExtRefSource(); // Set external voltage reference
  pstat.setIntZ(0); // Set internal zero as 20% of reference
  pstat.setThreeLead(); // Set three leads electrochemical cell
  delay(200);
}

```

LMP91000, ADS1115 and timer setup

(a)

```

void IRAM_ATTR onTimer() { //Interrupt code
  portENTER_CRITICAL_ISR(&timerMux); // Everytime the timer gets to 0.5 s
  interruptCounter++;
  portEXIT_CRITICAL_ISR(&timerMux); // InterruptCounter++
}

```

Interruption handle

(c)

```

pstat.setPosBias(); // Bias potential is positive
pstat.setBias(0); // Bias potential = 0

while (Serial.available() > 0) { // Wait until serial bus is available on LabVIEW GUI
  pstat.setPosBias();
  incomingByte = Serial.read(); // Read the bias potential selection
  if (incomingByte == 51) {
    pstat.setBias(5); // Bias potential 0.3 V
  }
  else {
    pstat.setBias(6); // Bias potential 0.4 V
  }
  timerAlarmEnable(timer); // Enable timer interruption

  if (interruptCounter > 0) {
    portENTER_CRITICAL(&timerMux);
    interruptCounter--; // InterruptCounter = 0
    portEXIT_CRITICAL(&timerMux);
    totalInterruptCounter++;
    results = ads.readADC_Differential_0_1(); // Read differential voltage between ADS1115 A0 and A1 (A0 - A1), digital byte

    tiempo = (h*totalInterruptCounter)-0.5; // Time for plot, 0 to 550 with 0.5 increments
    Serial.print(String(tiempo,1)); // Send first time via serial
    Serial.print(",");
    Serial.println(String(results * multiplier,6)); // Send the actual potential that ADS1115 read
  }

  if (totalInterruptCounter > 1100) { // When t = 550 s
    totalInterruptCounter=0; // Total interrupt Counter is 0
    timerAlarmDisable(timer); // Disable timer interrupt
    // Clean Serial bus and now wait for the serial bus to be
    // available on LabVIEW GUI
    Serial.flush();
  }
}

```

Amperometry code (b)

Figure S2b. Description of the programmed subroutines for AM3291 operation.

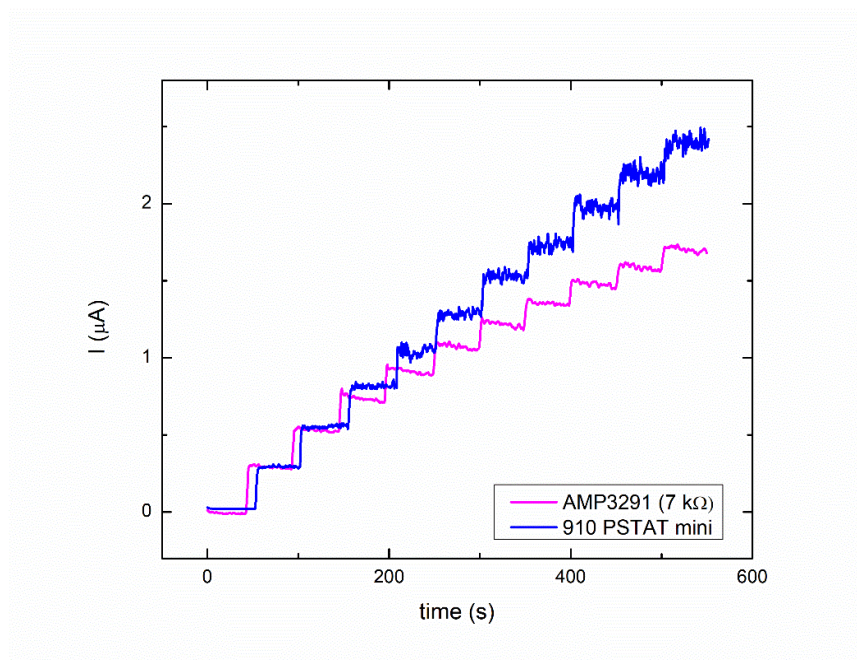


Figure S3. Detection of uric acid with the AM3291 at +0.5V.

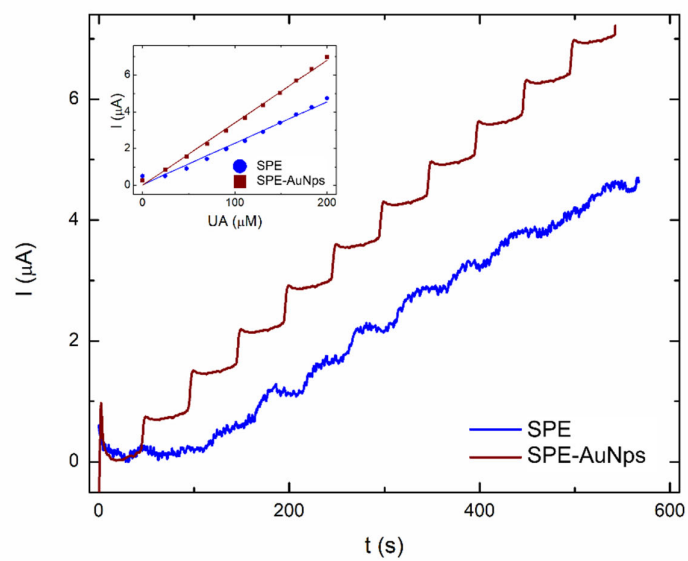


Figure S4. Detection of uric acid with the AM3291 at +0.3V in artificial saliva, comparison between SPE and SPE-AuNps.