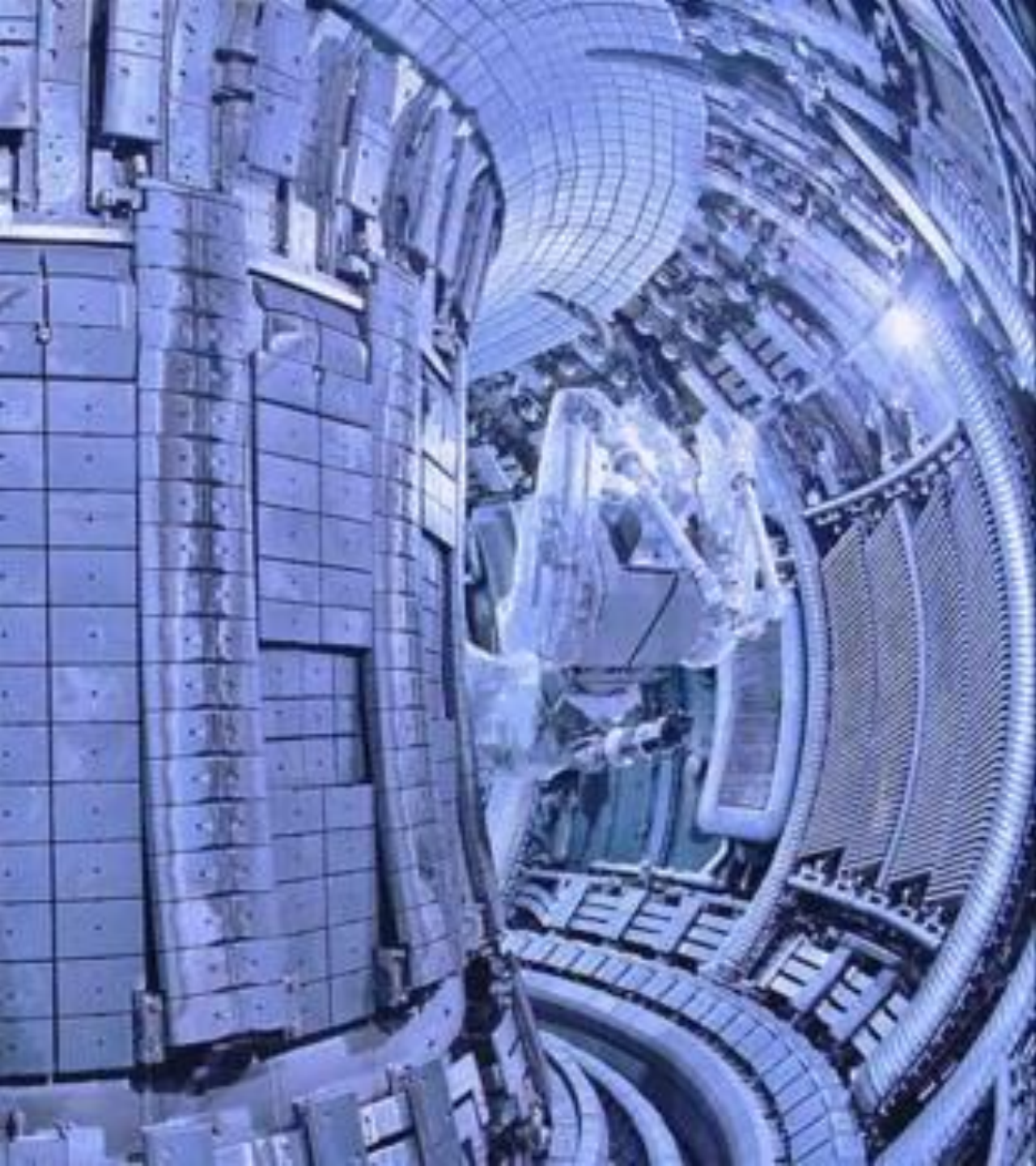


INFLUENCE OF GOLEM TOKAMAK OPERATING PARAMETERS ON PLASMA CURRENT





“

**IT WOULD PROVIDE
AN **INEXHAUSTIBLE**
SUPPLY OF ENERGY
WITHOUT
POLLUTION OR
GLOBAL WARMING**

”

STEPHEN HAWKING

“
**THE END
GOAL IS TO
CREATE MORE
EFFICIENT
REACTORS**
”

ASP NF 2018 GROUP 6





PRIMARY OBJECTIVE

**TO OBSERVE THE
EFFECTS OF OPERATING
PARAMETERS ON THE
PLASMA CURRENT**

SCOPE AND SIGNIFICANCE

- U_{CB} , U_B , P_{WG} , AND T_{CB} AND THEIR EFFECTS ON CURRENT.
- VALUES AVAILABLE ON THE GOLEM WEBPAGE
- ANALYSIS LOOKS ONLY AT PLASMA CURRENT, AND PLASMA LIFE ON FEW OCCASIONS.

SCOPE AND SIGNIFICANCE

- U_{CB} , U_B , P_{WG} , AND T_{CB} AND THEIR EFFECTS ON CURRENT.
- **VALUES AVAILABLE ON THE GOLEM WEBPAGE**
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SCOPE AND SIGNIFICANCE

- U_{CB} , U_B , P_{WG} , AND T_{CB} AND THEIR EFFECTS ON CURRENT.
- VALUES AVAILABLE ON THE GOLEM WEBPAGE
- ANALYSIS LOOKS ONLY AT PLASMA CURRENT, AND PLASMA LIFE ON FEW OCCASIONS.

SCOPE AND SIGNIFICANCE

**COULD LEAD TO THE DISCOVERY OF AN OPTIMUM
OPERATION SETTING RESULTING TO HIGH ENERGY
OUTPUTS**

METHODOLOGY

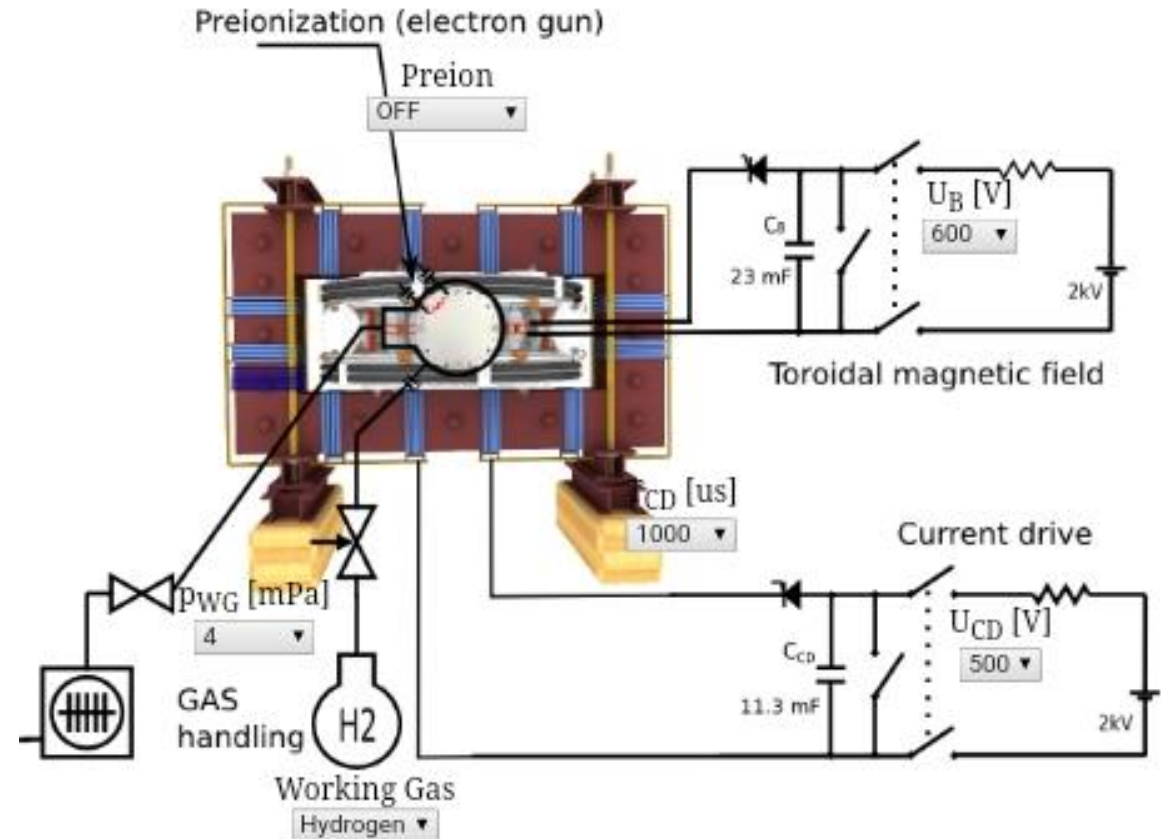
CONTROLLED AND EXPERIMENTAL VARIABLES

TEST FOR U_{CD}

- VOLTAGE VARIATIONS: 400 V, 500 V, 600 V, 700 V
- $U_B = 900$ V, $t_{CD} = 5000$ us, and $U_{CD} = 700$ V are kept constant

TEST FOR t_{CD}

- TIME VARIATIONS: 600 V, 900 V, 1100 V
- $U_{CD} = 700$ V, $U_B = 1100$ V, and $P_{WG} = 30$ mPa are kept constant



METHODOLOGY

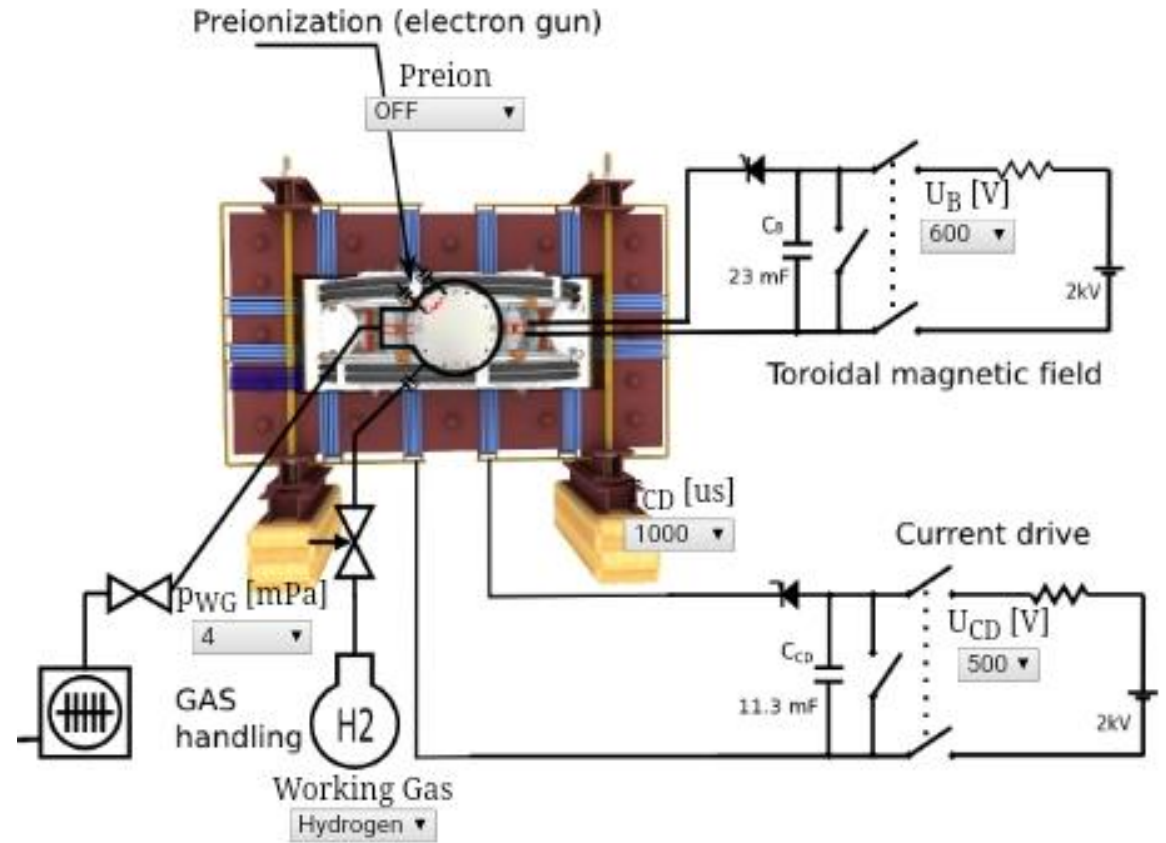
CONTROLLED AND EXPERIMENTAL VARIABLES

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METHODOLOGY

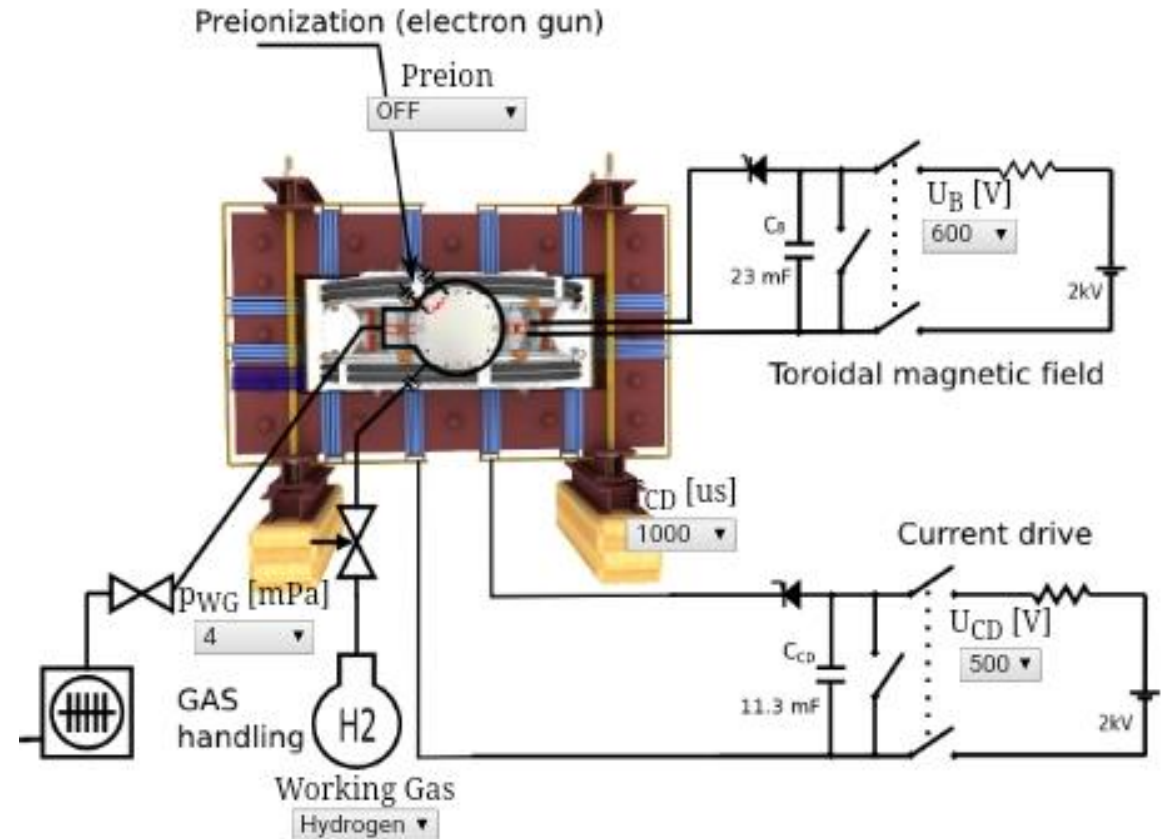
CONTROLLED AND EXPERIMENTAL VARIABLES

TEST FOR P_{WG}

- PRESSURE VARIATIONS: 16 mPa, 24 mPa, 30 mPa
- $U_B = 1100$ V, $t_{CD} = 5000$ us, and $P_{WG} = 30$ mPa are kept constant

TEST FOR U_B

- VOLTAGE VARIATIONS: 600 V, 900 V, 1100 V
- $U_{CD} = 700$ V, $t_{CD} = 5000$ us, and $P_{WG} = 30$ mPa are kept constant



METHODOLOGY

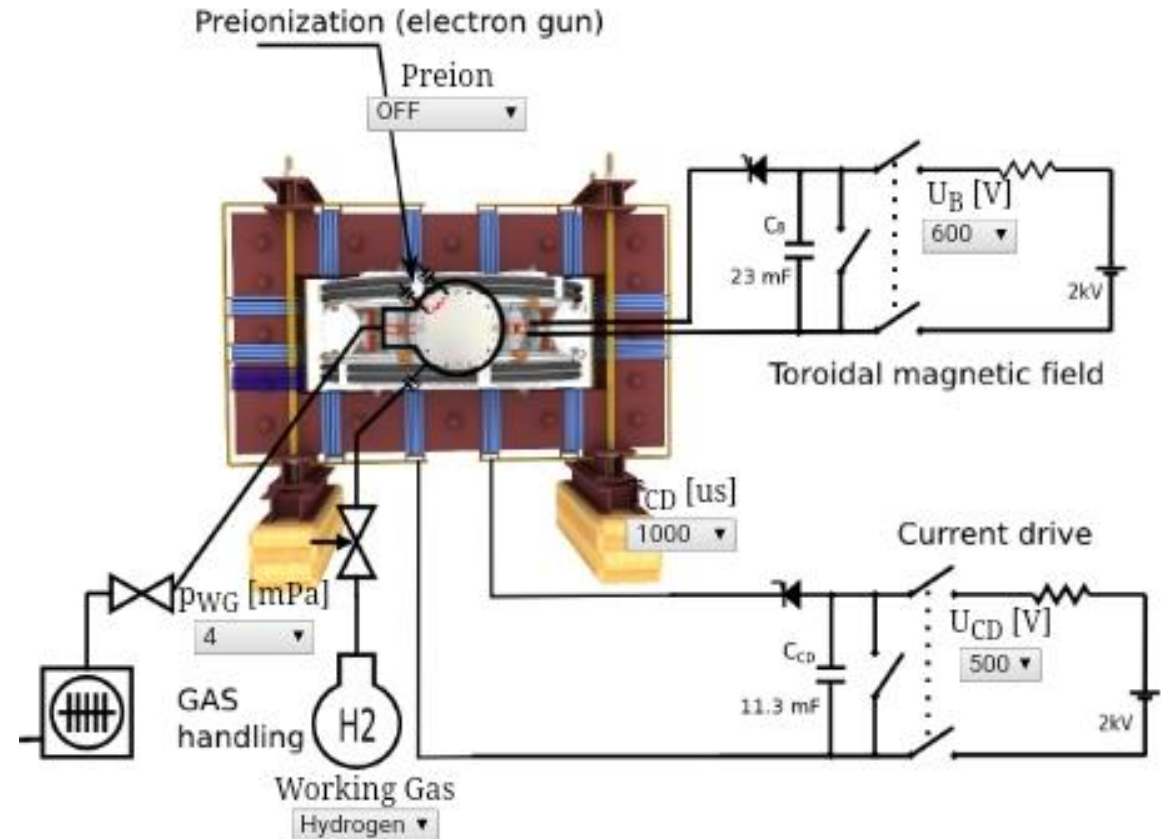
CONTROLLED AND EXPERIMENTAL VARIABLES

TEST FOR P_{WG}

- PRESSURE VARIATIONS: 16 mPa, 24 mPa, 30 mPa
- $U_B = 1100$ V, $t_{CD} = 5000$ us, and $P_{WG} = 30$ mPa are kept constant

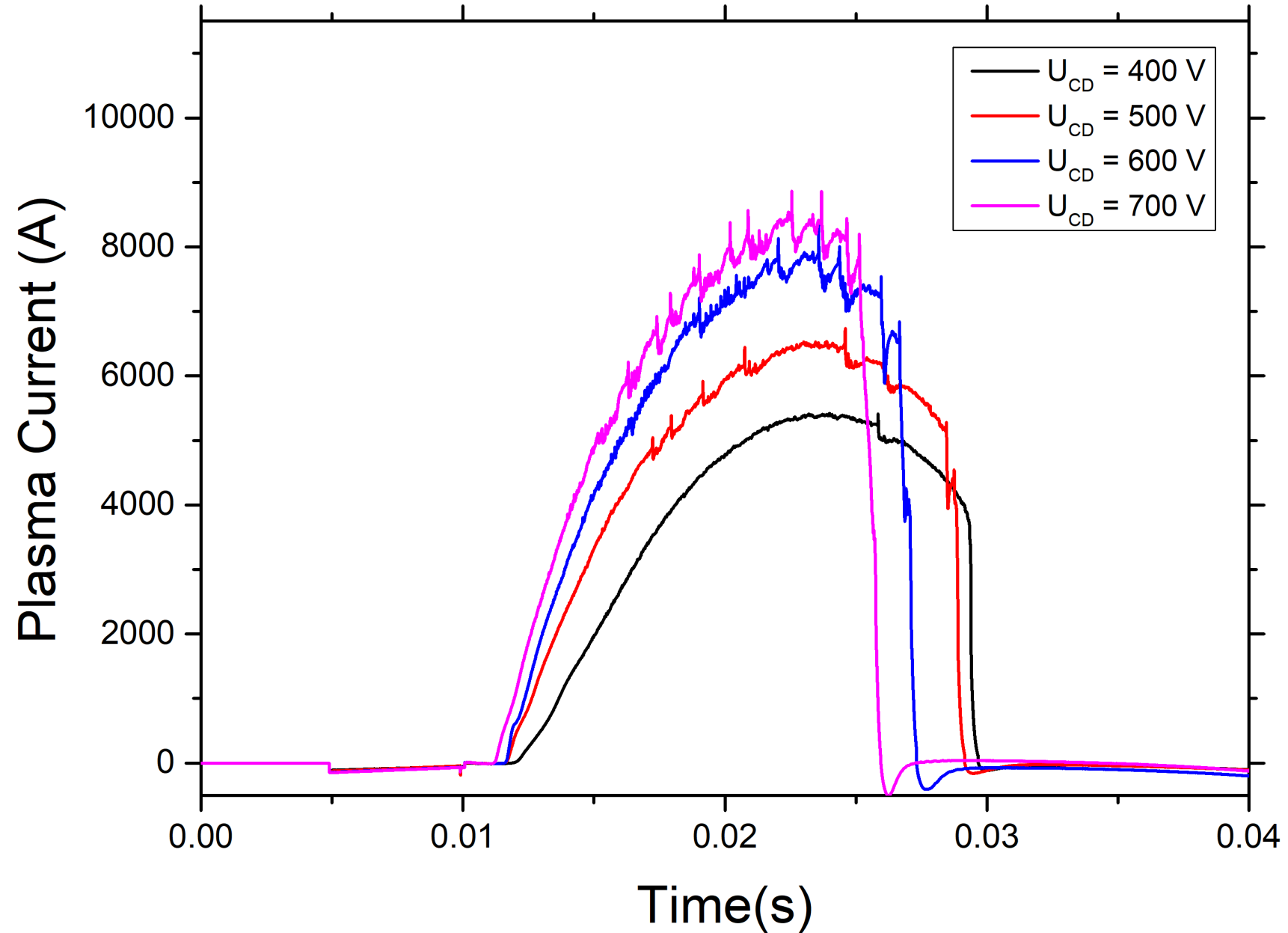
TEST FOR U_B

- VOLTAGE VARIATIONS: 600 V, 900 V, 1100 V
- $U_{CD} = 700$ V, $t_{CD} = 5000$ us, and $P_{WG} = 30$ mPa are kept constant



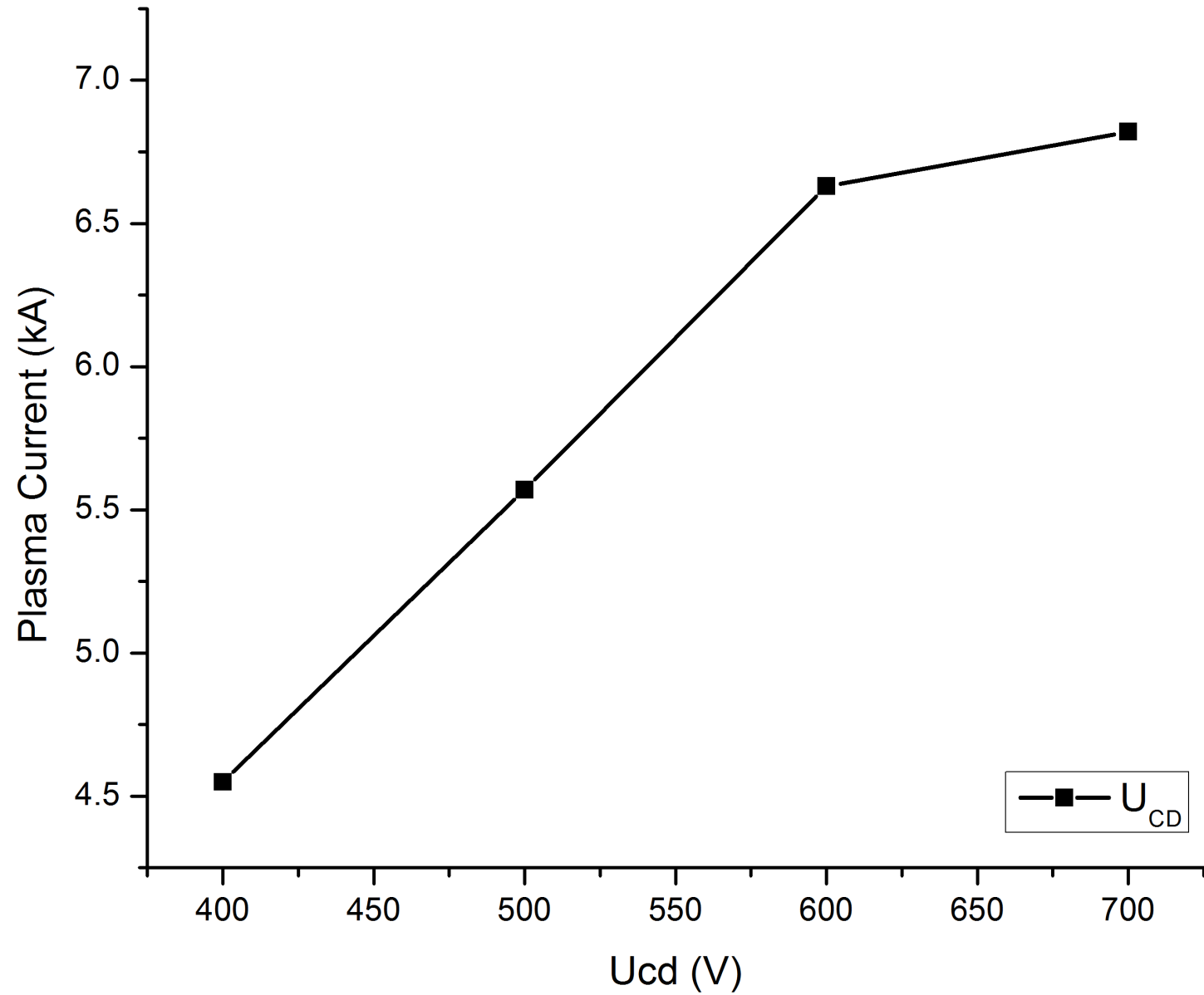
RESULTS AND DISCUSSION

TEST FOR U_{CD}



RESULTS AND DISCUSSION

TEST FOR U_{CD}

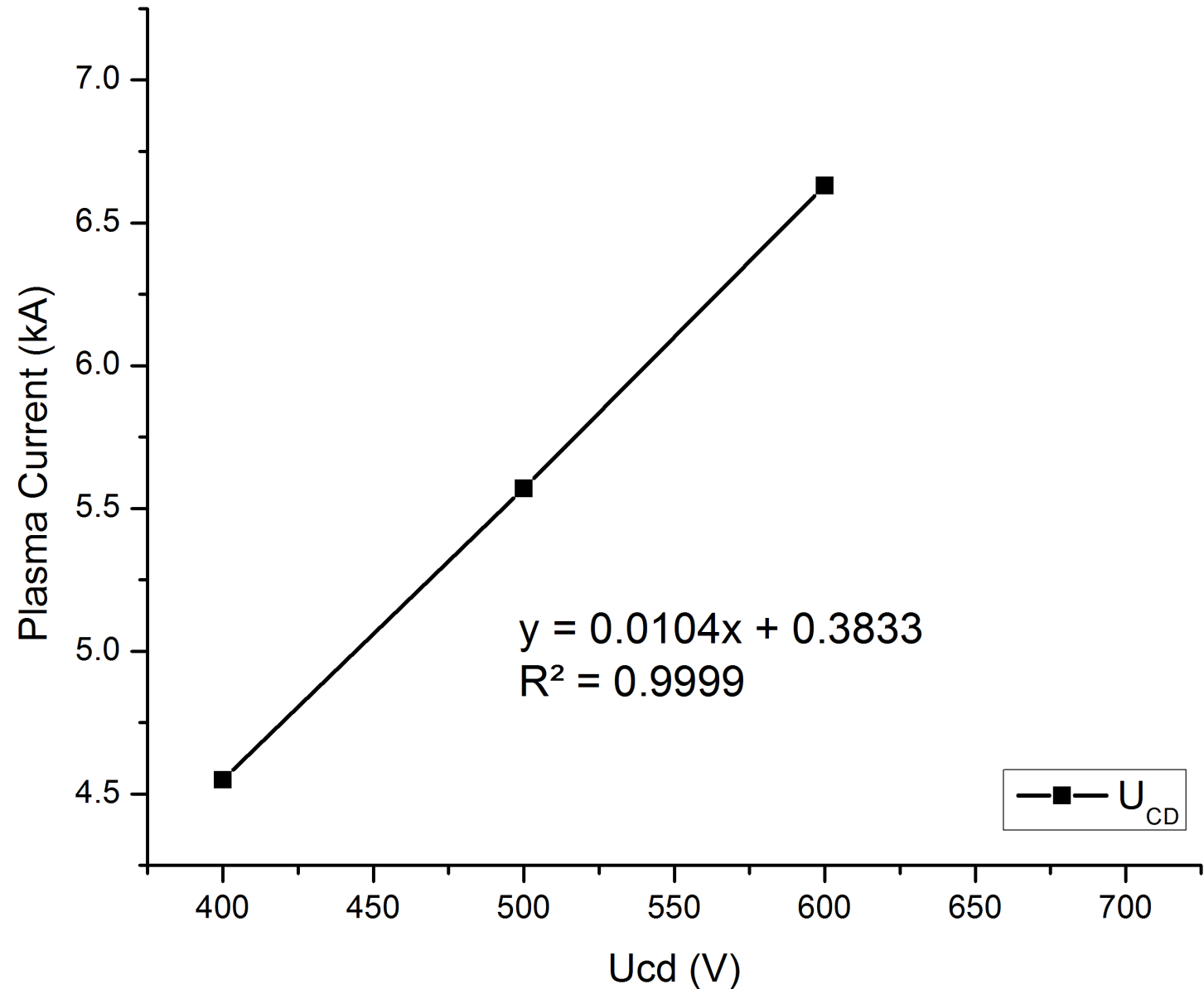


RESULTS AND DISCUSSION

TEST FOR U_{CD}

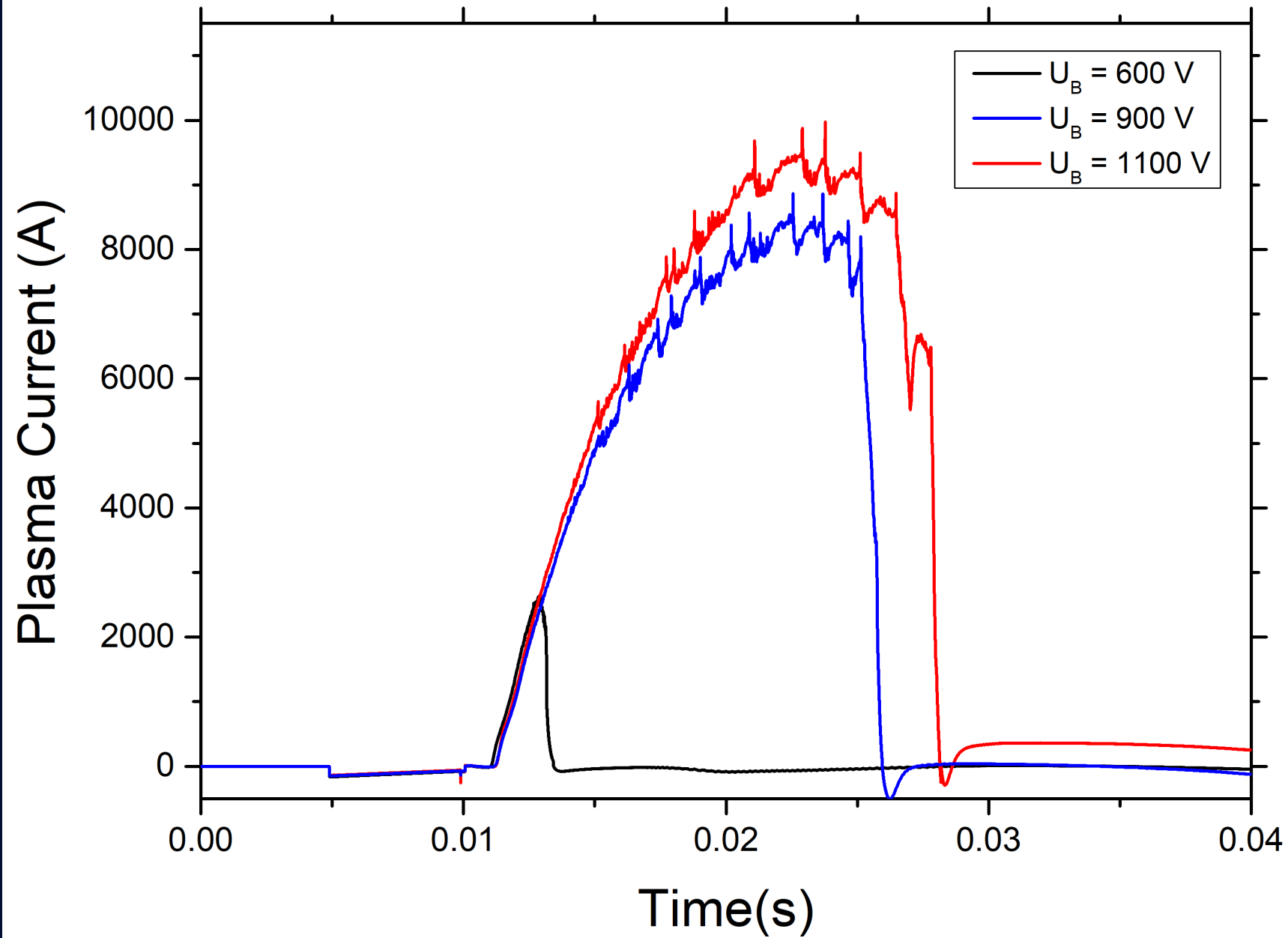
$$R_p = 3.3 \times 10^{-8} / T_e^{3/2}$$

T_e remained constant
from 400V to 600 V,
decreased drastically at
700 V



RESULTS AND DISCUSSION

TEST FOR U_B

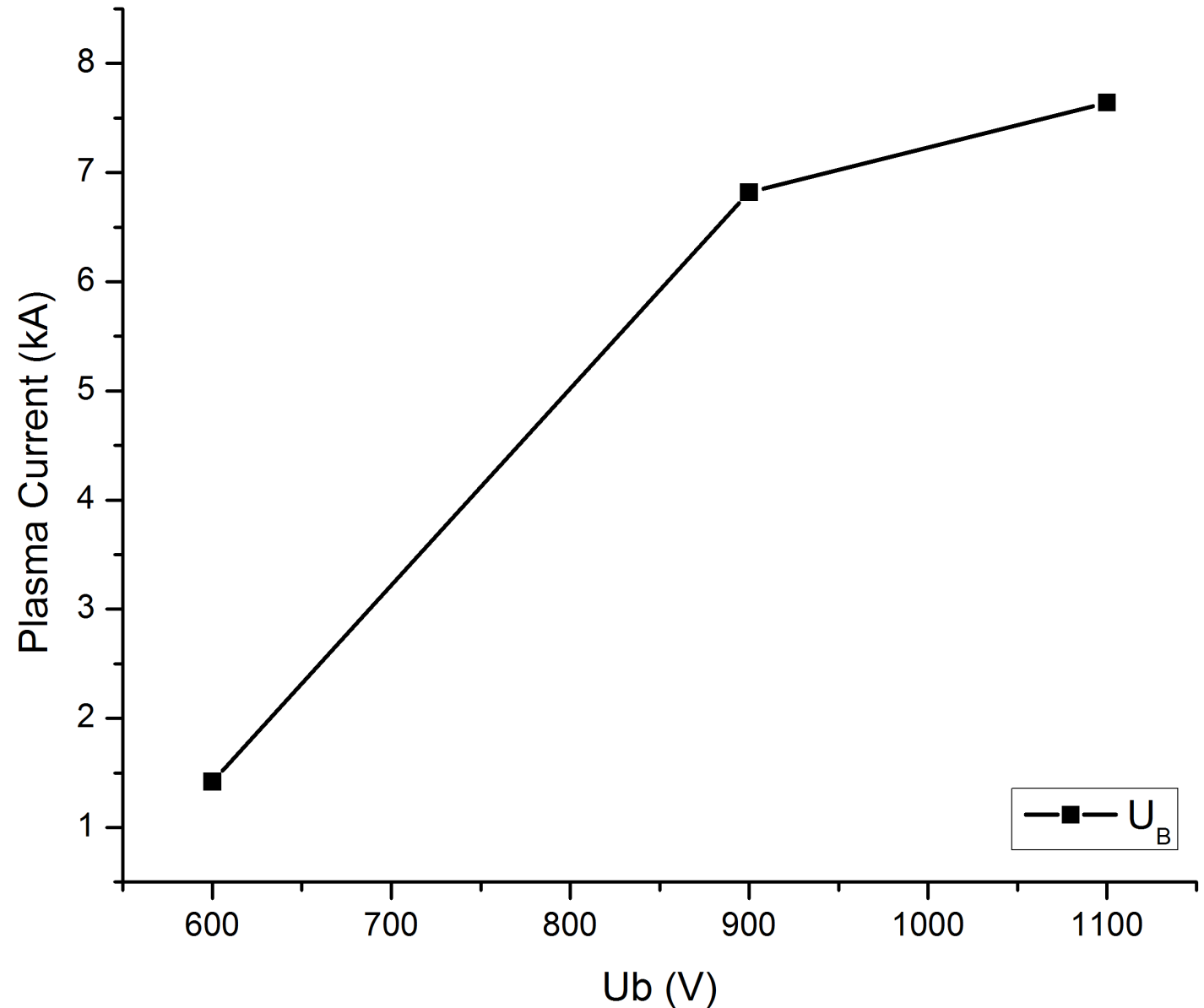


RESULTS AND DISCUSSION

TEST FOR U_B

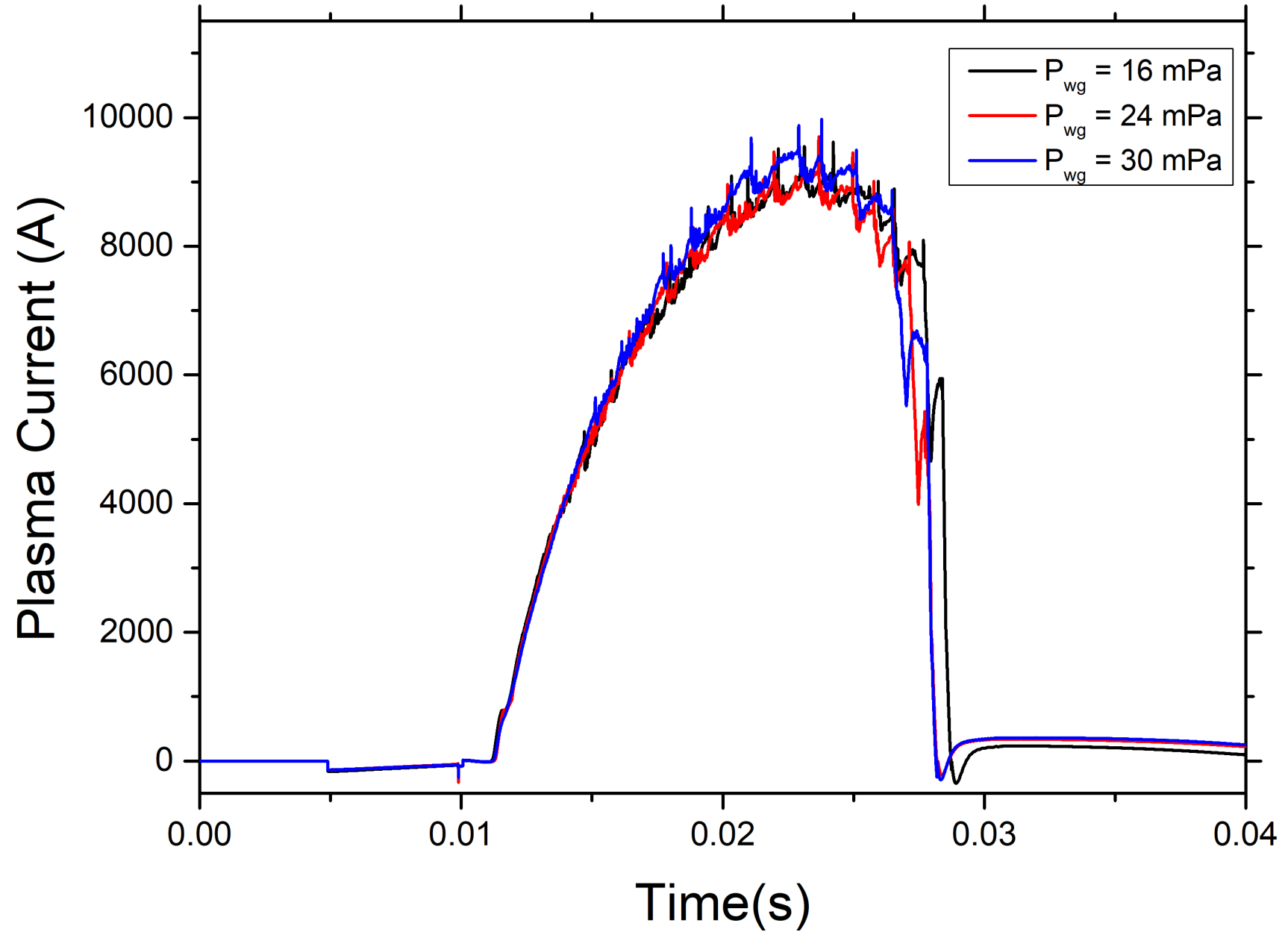
$$V=IR$$

MEAN TOROIDAL
FIELD INCREASES
WITH U_B (0.15 T to
0.38 T)



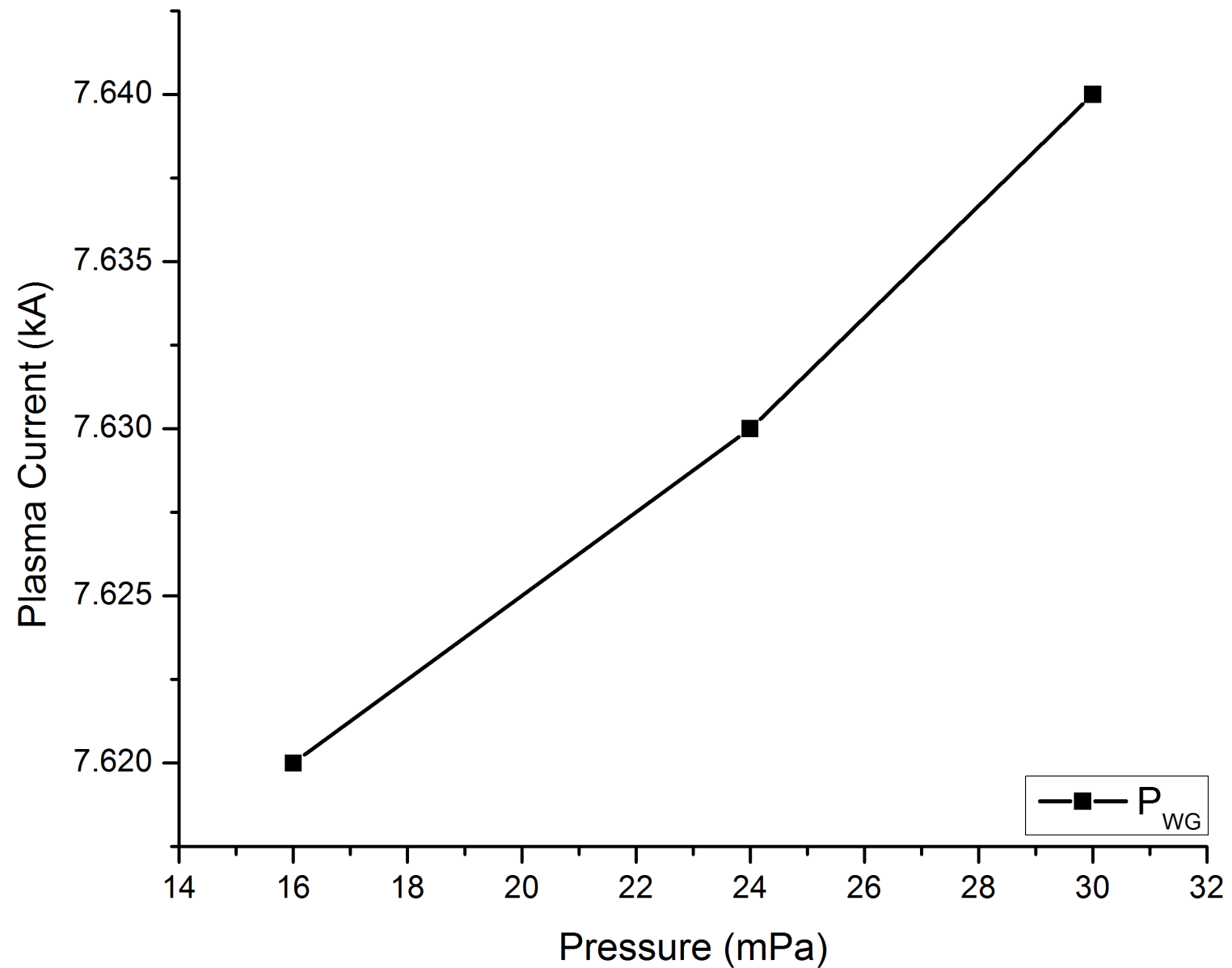
RESULTS AND DISCUSSION

TEST FOR P_{WG}



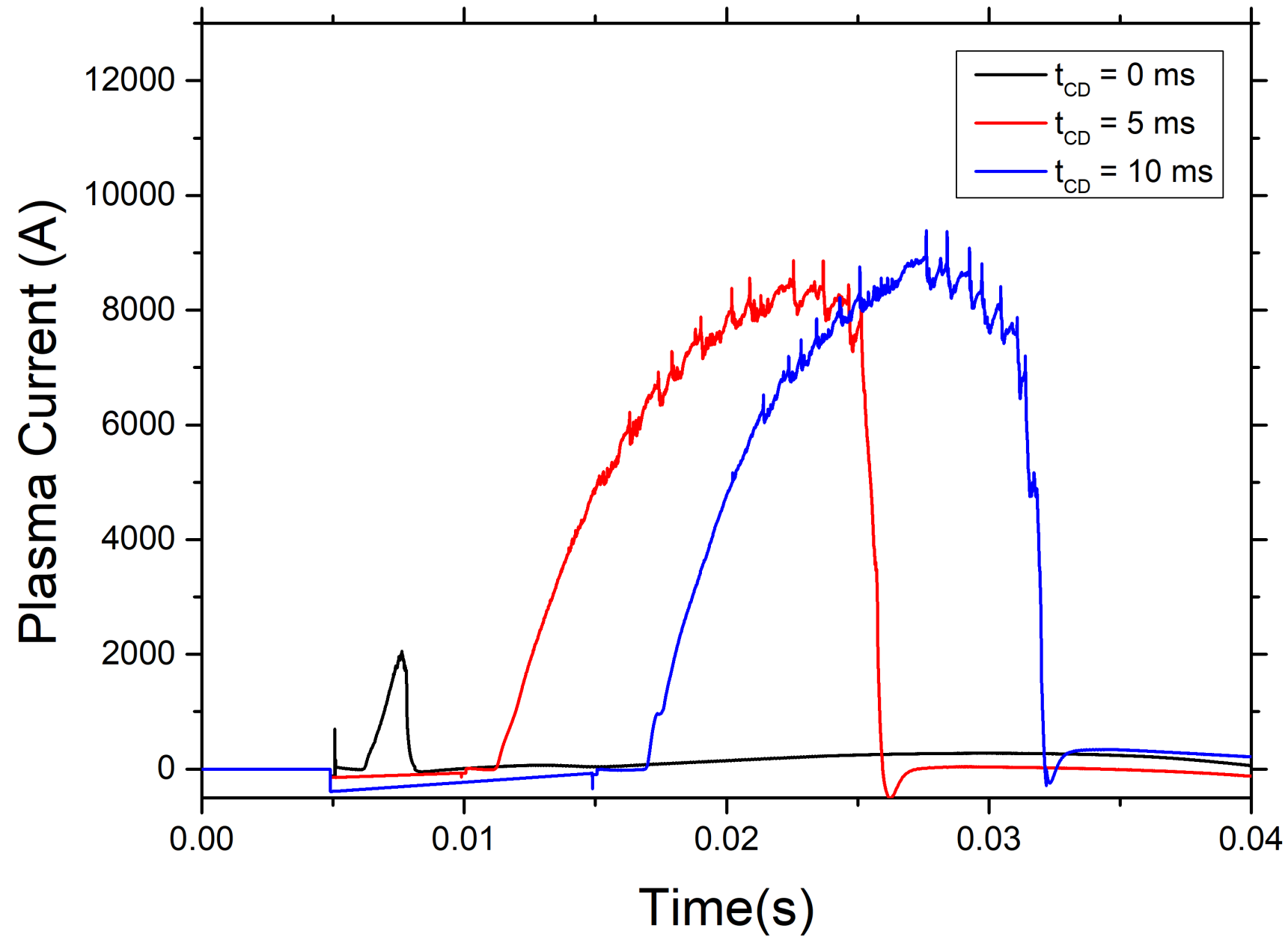
RESULTS AND DISCUSSION

TEST FOR P_{WG}



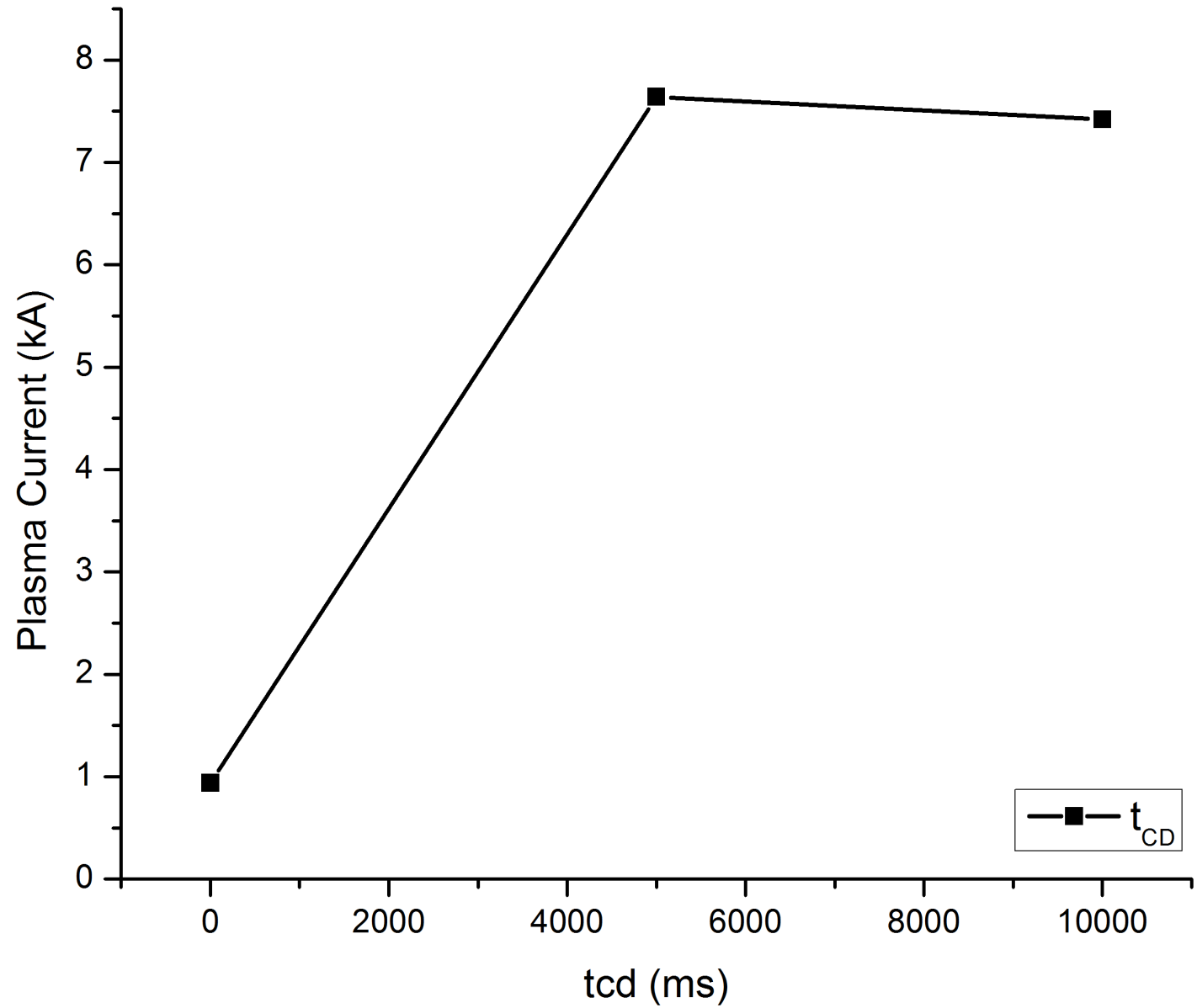
RESULTS AND DISCUSSION

TEST FOR t_{CD}



RESULTS AND DISCUSSION

TEST FOR t_{CD}



CONCLUSION

- AS U_{cd} IS INCREASED, THE PLASMA CURRENT ALSO INCREASED. AT LOW VOLTAGE VALUES (<700 V), THE CURRENT SEEMED TO BE LINEARLY PROPORTIONAL TO U_{cd}
- AS U_B IS INCREASED, THE PLASMA CURRENT ALSO INCREASED.
- ALTHOUGH INCREASING THE PRESSURE INCREASES THE PLASMA CURRENT, THE DIFFERENCE IS QUITE SMALL THAT SIGNIFICANCE CAN BE DEBATED
- INCREASING TIME DELAY BETWEEN U_B AND U_{CB} RESULTS TO BETTER PREIONIZATION EFFICIENCY, THUS HIGHER PLASMA CURRENTS



**THANK YOU FOR
LISTENING**